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MODEL AIRPLANE NEWS

DECEMBER 1957—35 CENTS

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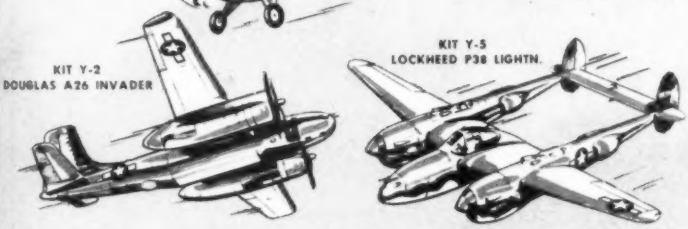
KIT Y-5	LOCKHEED P38 LIGHTN.	KIT Y-12	N. AMER. F86D SABRE JET
KIT Y-6	REPUBLIC F84F THUNDERSTR'K.	KIT Y-13	GULL
KIT Y-7	GRUMMAN F9F-6 COUGAR	KIT Y-14	AERONCA CHIEF



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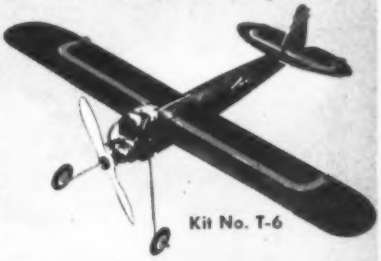

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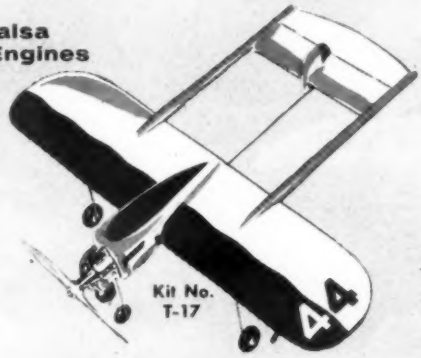

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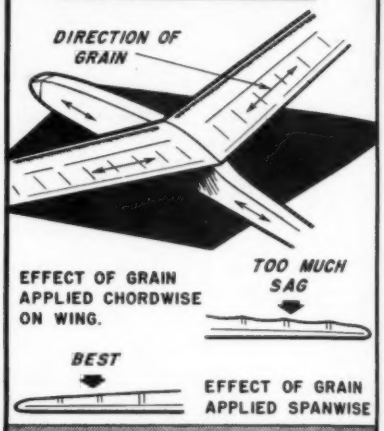
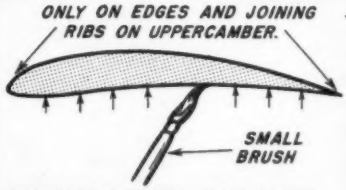
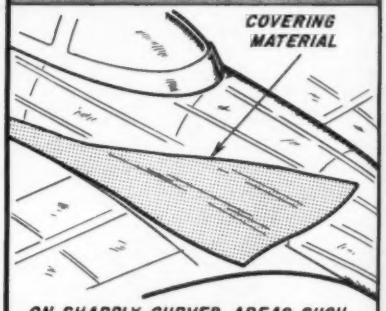
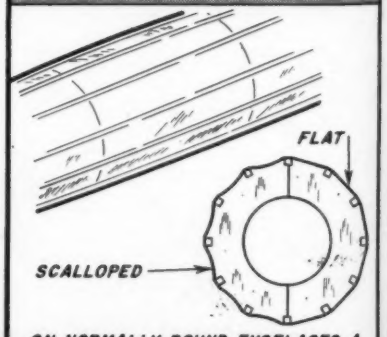




TO FASTEN COVERING TO LOWER SURFACE OF AN UNDERCAMBERED WING, APPLY ADHESIVE TO EACH RIB SURFACE, IN ADDITION TO EDGES.



ON SHARPLY CURVED AREAS SUCH AS WING FILLETS, USE COVERING MATERIAL WHICH CAN BE APPLIED WET. LIKE SILKSPAN, SILK OR NYLON.



ON NORMALLY ROUND FUSELAGES, A SMOOTHER COVERING CAN BE OBTAINED BY EITHER SCALLOPING OR FLATTENING BULKHEADS BETWEEN STRINGERS.

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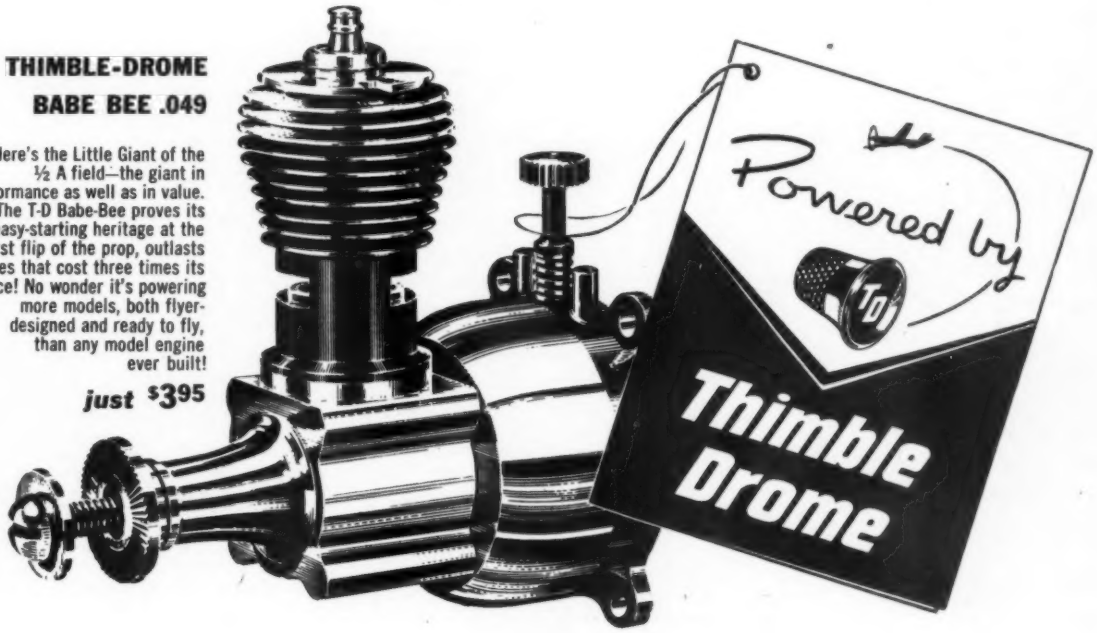

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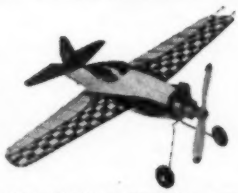

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29th Year of Publication

MODEL AIRPLANE NEWS

JAY P. CLEVELAND, President and Publisher

DECEMBER 1957 Vol. LVII, No. 6

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by William Winter

► Some people think of any columnist or editorial writer as a mad bomber who plants his own explosive issues. The notion appeals to MAN at Work. Overheated RC engines stuffed with varnish should be good for something. Actually, "issues" rain down like hailstones, or like contest free flights if we may exaggerate.

Has the trade forgotten the sticks-and-paper modelers? Jobbers, dealers, modelers, and manufacturers have swamped us with pros and cons. Some dealers agree, but some modelers disagree. Even trade magazines are asking what in thunderation goes on. Then there is the issue of the FCC, traffic lights, and new frequencies. Suffice it to say that you can fly many present day receivers on any of the proposed frequencies near 27.255 without retuning. Comes the dawn! There is even a battle over the recent McCombs article on free-flight adjusting. Experts meet themselves coming and going. MAN is off its rocker say some; others say it's true, and they use the same system. So, for the month, let the "world" issues go hang, while we catch up with this McCombs business and other modeling matters.

• • •

► McCombs, it will be recalled, propounded the notion that a free flight achieved maximum climb—not angle of climb, mind you—when the center of gravity was a prescribed distance behind the leading edge. This distance depends on the airplane. The ship will fly, and fly well, with the CG at other positions but there is one best spot for the CG (that does not stand for Carl Goldberg or Charlie Grant, either). Our boy stated that, in essence, a "loopy" airplane should be made to fly right by reducing the angular difference between wing and tail (provided it is not overdone to the point that the ship flies over the top and dives in as the tail takes over at high speeds) and moving the CG back further.

McCombs reduced angular difference by increasing the stabilizer angle of incidence. The idea works in reverse, too, if necessary. That the CG should be moved back to stop loops horrifies the trigger brains. Flies in the face of all that is holy, sez they. And at first, to MAN at Work, too, McCombs initial short article (rewritten in detail as you read in the September 1957 issue) didn't get a pop out of ye Ed. Everybody has notions and who was McCombs? (*Continued on page 64*)

NEXT MONTH'S COVER
Lockheed Lightning

PLANE ON THE COVER

The gallant defense put up by the Spitfires in the Battle of Britain made the "Spitter" the most famous fighter of the last great war. Built in many marks, the Spitfires saw many duties. Jo Kotula's exciting cover painting is based upon the Spitfire V, with a 1,250 hp Merlin. Light, with ample wing area, it was a maneuverable fighter. And one of the prettiest.

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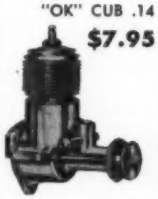
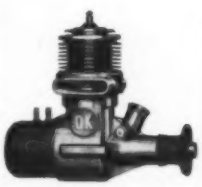


"OK" CUB .19 **$7.95**



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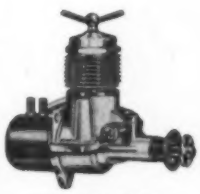

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Mite Jet .051 1.48 Mini 307 ... 11.48
Jetex Atom .38 ... 1.49
Jetex 80 — .98 Contest Set. ... 1.98
Rotomotor 1.98 Scorpion 680 ... 1.98
Post 50 ... 1.00

ELECTRIC MOTORS

Pittman "Partner" 6.75 Super Dynamite ... 7.95
Outboard Jr. 1.98 Super ... 2.95
Mighty Mite 1.25, Super ... 1.95
Johnson or Evinrude Outboard ... 8.95

ENGINE ACCESSORIES

2 Speed Tank (Tower) w/nee ... 5.95
Tatone Glowlight Starter ... 1.95
1069 Clockwork Timer ... 3.98
Throttle Control (Bramco) ... 4.95
Roto Valve ... 6.95
Fox Radial Mt. Plate .29 to .35 ... 1.00
McCoy .049 Radial Mt. Adaptor ... .35
Darvin Mounting Plates ... .50
Thermal Hopper Std. Ctrl. ... 1.95
Speed Pans (Mennonum):
Top Rim Cowl Stab Wing
½A 1.95 1.95 1.95 .85 3.50
A 2.95 2.95 2.50 .85 3.50
B 3.45 3.45 2.75 1.00 4.50
C 3.95 3.95 3.00 1.50 5.50
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Wasp Micro Tank (FF) ... 1.00
Needle Valves:
Fox, OK, McCoy 804 ea. ... .80
McCoy Micro, K & B ... .85
2 Speed Timer—O & R ... 1.35
McCoy .29; R.H. Restrictor .80
.09 to .16 Milspeed Hdl. Valve ... 2.50
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Thermo Hopper Head & Mount ... 1.00
K & B Radial Mt. .19, .23, .29 ... 1.00
Gas .099 Mfg. Bracket ... .25
Gas-Jets (give size of engine) ... .25
Vibrator Coil (Jet) 7.98 Deluxe ... 16.95
Muffler Valve (Dynajet) ... 1.00
Metering Jet (Dyna) 2-3-4-5-6-7 ... .75

AIRPLANES

U-CONTROL PLANES

Aero Comdr. 33" (2) .049 - .099 ... 9.95
Aeronca Chief 17" .049 - .074 ... 2.95
All Amer. Stunt 36" A-B ... 5.95
All Amer. Sr. Stunt 51" B-C ... 10.95
American Boy 18" .020 to .074 ... 1.29
Apprentice 24" .049 to .099 ... 2.95
Arrowjet 24"—.049 to .074 ... 2.95
Atomic 18" .039 to .074 ... 1.95
Bab Jet Bomber 18" .039 - .074 ... 1.95
Baby Barnstormer 30" AA ... 3.25
Baby Clown 22" AA ... 1.50
Bambino 14" AA ... 1.00
Barnstormer 42" A-B ... 6.50
Bearcat 35" C-D ... 4.95
Beechcraft 15" AA-A ... 1.00
Boeing P26A 18" AA ... 1.95
Bonanza 18" .035 to .074 ... 1.95
Monocoupe 36" .29 to .35 ... 5.95
Monocoupe 18" .039 to .074 ... 1.49
Monoline Trnr. 36" .19 to .35 ... 4.95
Monoline Jr. 18" .049 to .099 ... 1.98
Mr. Mulligan 18" .049 to .074 ... 1.98
Mr. Mulligan 42" .29 to .35 ... 6.95
Mustang 27" A-B (Bertolan) ... 10.95
Mustang (Sterling) 17"-.15 to .35 ... 3.50
Mustang (Veco) 48" B-C ... 7.95
Mustang (Monarch) 20" AA-A ... 4.95
Mustang P51 19½" .049 to .099 ... 2.29
Mustang 30½" .19 to .35 ... 9.95
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Navion 42" .19 to .35 ... 3.50
Nieuport 28 .23" .29 to .60 ... 6.95
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No. Amer. AT6 18" AA ... 1.95
No. A. AT6 15½" .049 to .074 ... 1.29
N.A. Savage 36" .049 - .099 ... 7.95
Northrop "Gamma" 16" .020 - .049 ... 1.50
Nyasa 21" .15 to .29 ... 4.50
P38 Lightning 41" .14 to .29 ... 8.98
P40 Flying Tiger 18" .039 - .074 ... 1.95
Pacemaker 15" ... 1.00
Peter Pan 16" AA ... 1.00
Piper Cherokee 18" .039 - .074 ... 1.95
Piper Cub Cruiser 18" .039 - .074 ... 1.69
Piper Sea Scout 18" .035 to .074 ... 1.95
Piper Super Cruiser 18" ... 1.95
Pitts Special 25" .14 to .29 ... 5.95
Polish Fighter 36" .29 to .49 ... 6.95
Poly Barnstormer 30" AA ... 3.25
Profile Trainer (24" .049 to .099 ... 3.25
Trainer 34" .15 to .29 ... 4.50
Trainer III 36" .19 to .35 ... 5.95
Quest 32" B ... 4.98
Ranger Trainer 32" .14 to .29 ... 3.95
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Red Devil Flash 18" ... 1.95
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Snapper ½A 24" .039 to .074 ... 2.95
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Starman 16" AA ... 1.00
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Stuka 18" .039 to .074 ... 1.95
Stuka 23½"- .049 to .099 ... 3.95
Piper Cub 27" .049 to .074 ... 2.50
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Smoose 36" .039 to .074 ... 2.50
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Bootstrap "A-RC" 54" AA-A ... 4.95
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Breezy Sr. 56" .049 - .074 ... 9.95
Bubl-Pup 27" — .049 ... 2.95
Cessna 180 35" AA ... 2.95
Cessna 180 54" B-C ... 12.95
Cessna 172 54" .09 to .19 ... 7.95
Cessna 172 60" .09 to .15 ... 8.95
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Flash (Plastic) 17" Outboard ... 2.98
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PYLON control lines:
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2" - 60c; 2½" ... .85
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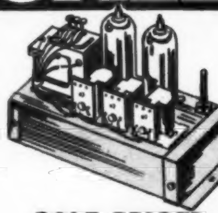

SALE PRICED

	REG.	SALE
3 CHANNEL	$79.95	59.79
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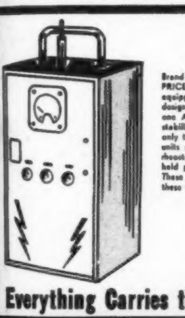
ONLY A LIMITED QUANTITY AVAILABLE!



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6 CHANNEL	95.00	69.79

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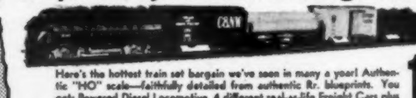

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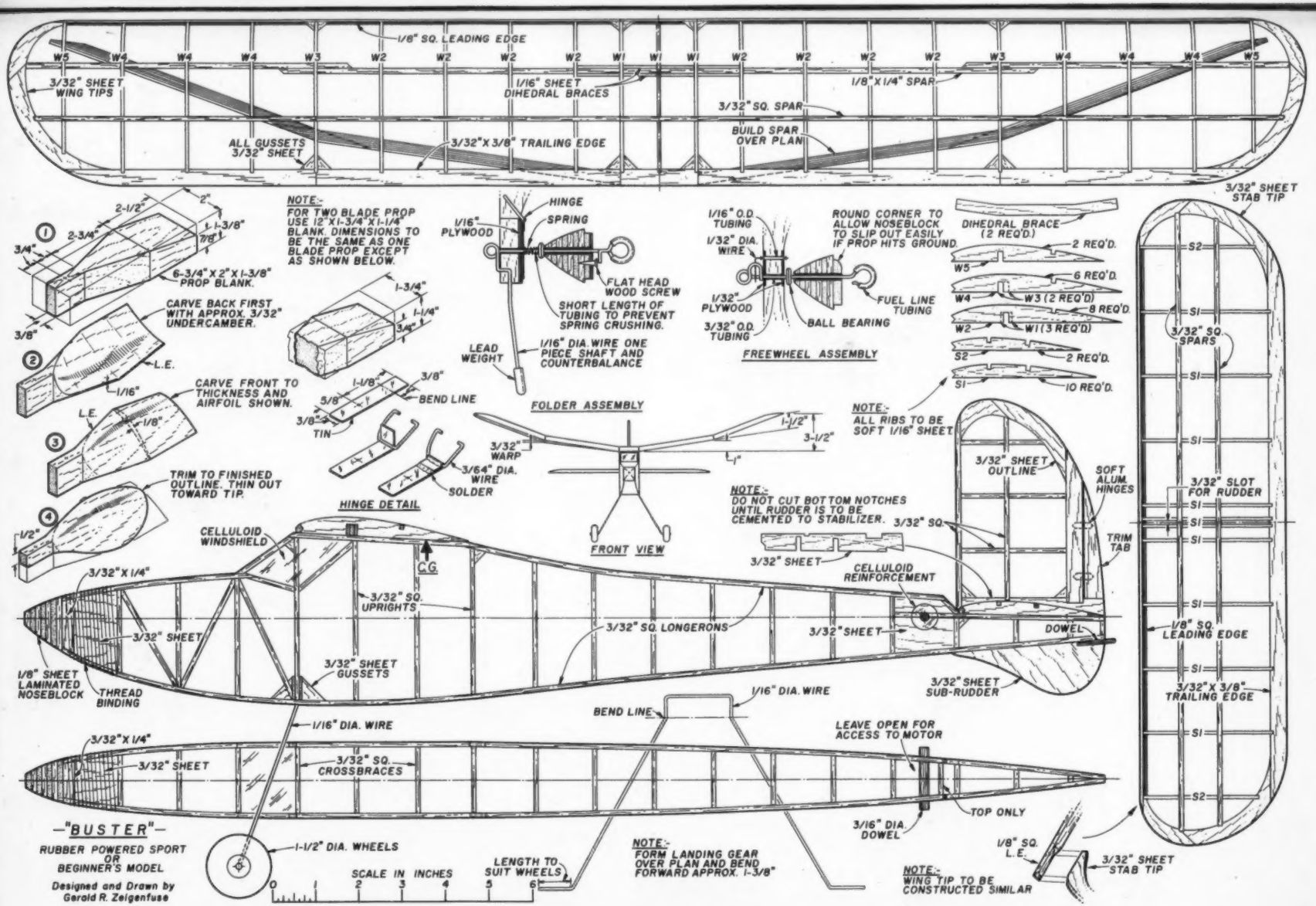
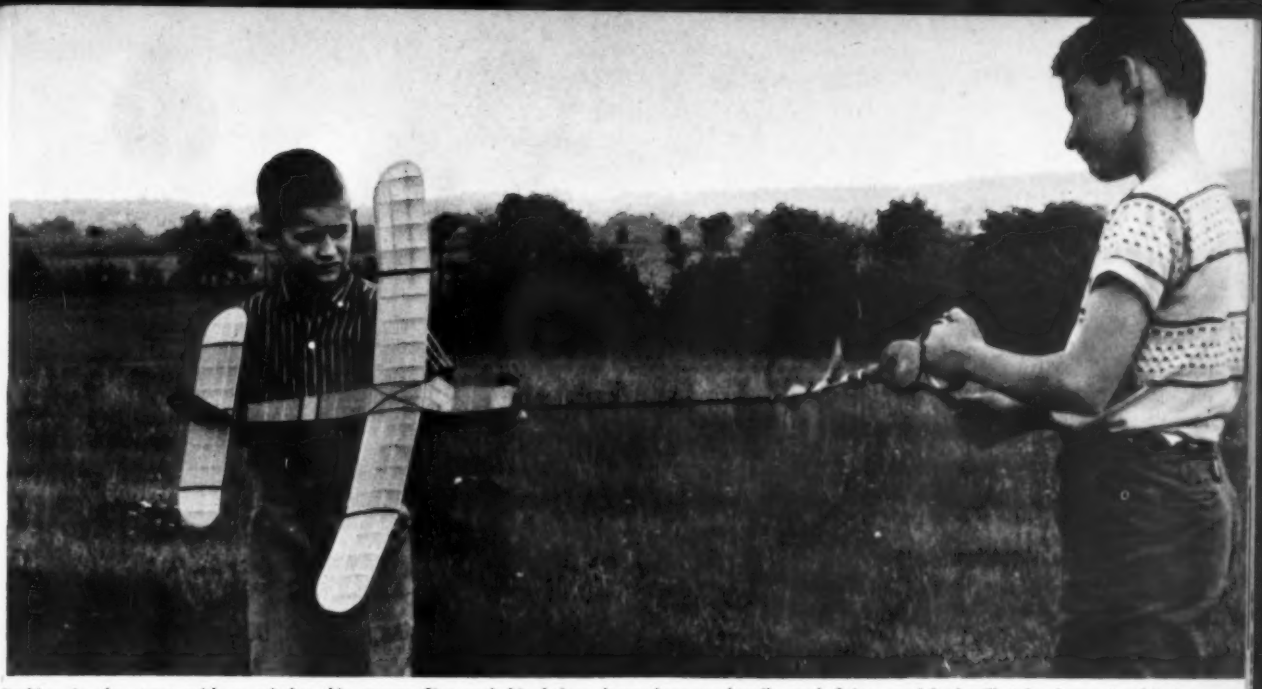


FULL SIZE PLANS AVAILABLE. SEE PAGE 56.



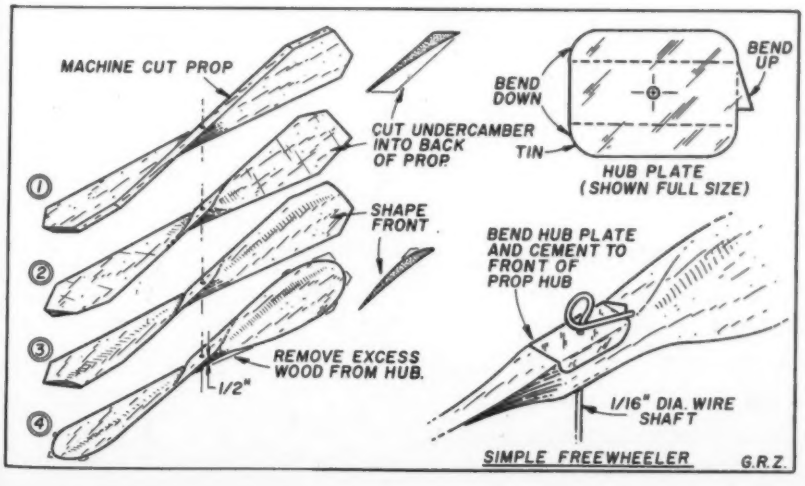
Packing in the turns with a winder this young flier and his helper learn how to handle real flying model—they'll take home trophies!

Buster!

MAN is proud to present this rubber-powered model. It is mighty fine flier. Easy to build—but takes some "try."

by GERALD R. ZEIGENFUSE

Hand winding for a short test flight, the author uses a contest-type folding one-blade prop.



► Buster is a plane that will be enjoyed by both beginner and experienced builder. For the experienced it is just the thing on a nice day when you don't want to risk flying all those hot contest jobs. For the beginner, it is the next step up towards contest models from such planes as the "Quickie Mail Plane," in the January, 1957 issue, by Sherman Gillespie.

Buster is an excellent stable performer. Because of its light weight, it is rarely damaged. It is simple to build, uses no odd sizes of wood. Commercial props may be used as substitutes for the ones shown on the plan; but I recommend carving your own prop, as it is no more difficult than carving a hand-launch glider wing. A prop is merely a twisted wing anyway! Well, let's start to build it. Study the plans and read the article thoroughly and I'm sure that you will find this a most enjoyable building project.

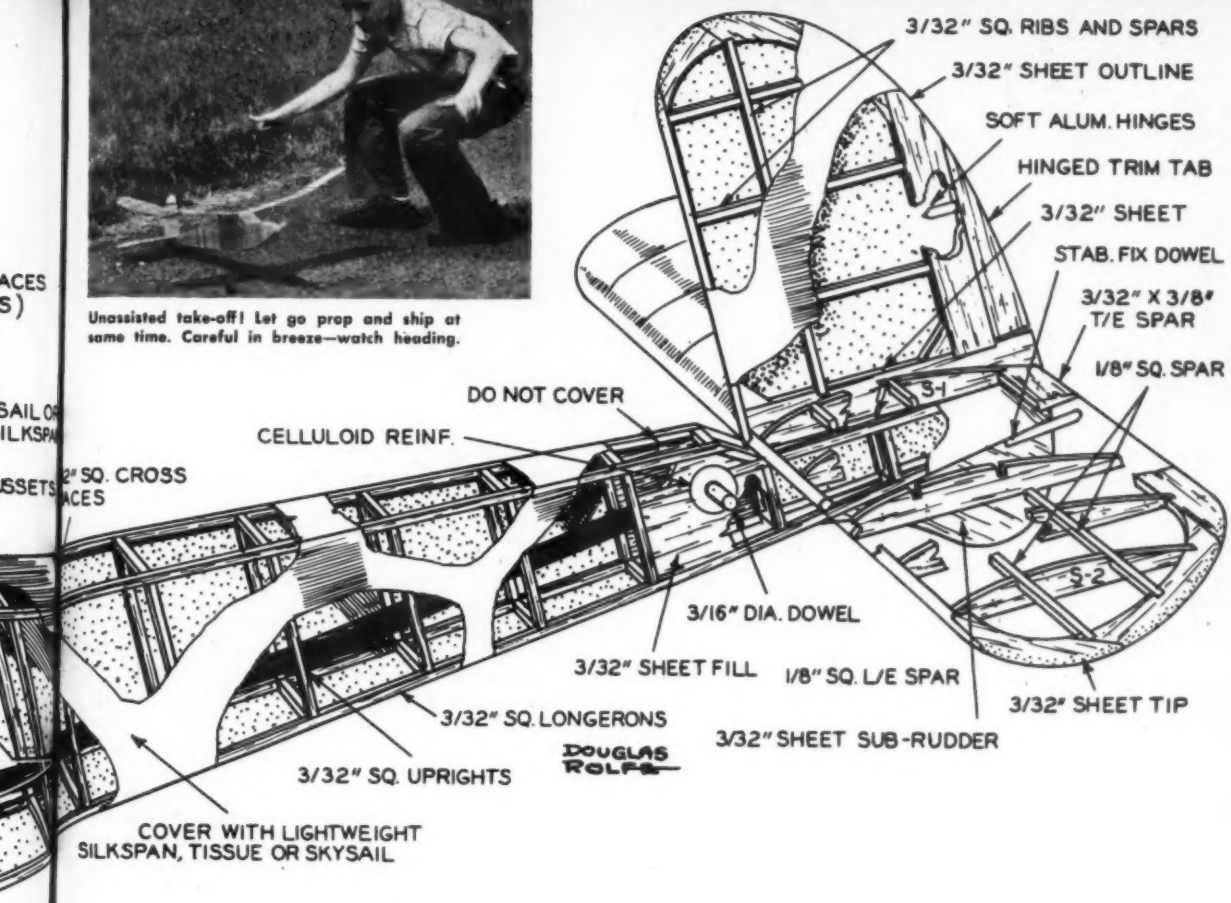
FUSELAGE: Select four very hard 3/32" sq. strips. They should be as nearly equal in strength as possible to prevent uneven bending, which would pull the fuselage out of line when assembling it. These are the longerons and we (*Continued on page* 13)

How to hand launch: release prop, then gently push ship forward. Don't push up into stall.

3/32" SHEET TIP
3/32" X 3/8" T/E SPAR
1/16" SHEET RIBS THRUOUT
1/8" X 1/4" FRONT SPAR
3/32" SQ. REAR SPAR
3/32" SHEET GUSSETS
1/16" PLY DIHEDRAL BRACES (MAIN SPAR JOINERS)
1/8" SQ. L/E SPAR
JAP TISSUE, SKYSAIL OR LIGHTWEIGHT SILKSPA
3/32" SHT. GUSSETS
W-4
W-3
W-2
W-1
W-1
W-1
W-3
2-BLADED PROP. OPTIONAL
CELLULOID WINDSHIELD
LAMINATED NOSE BLOCK
3/32" SQ.
3/32" SHEET FILL
3/32" X 1/4"
3/32" SHEET GUSSETS
1/16" SHEET L/G FIX PLATES
1/16" M/WIRE L/G STRUT
1-1/2" DIA. WHEELS
HINGE
SPRING
THREAD BINDING TO END OF NOSE BLOCK
3/32" SQ. DIAGS.
8 STRANDS 1/4" T-56 RUBBER
COUNTER-BALANCE

To be a proficient flier, a guy has to learn how to cut and cement "sticks," and to cover with paper and dope. To know how an airplane works, what stability really is, build this free-flying ship.

Unassisted take-off! Let go prop and ship at same time. Careful in breeze—watch heading.



begin by pinning two of them to the plan, after having placed wax-paper over it to protect it. Carefully cut out the 3/32" sq. uprights and cement in place. Also cut out and cement in place the 3/32" sheet fill-ins at the nose and at the rear motor hook locations. When cutting these out, it is wise to make a duplicate set for the second fuselage side.

Now build the second side over the first to be sure they are exactly alike. When dry (preferably overnight), lift from the plan and separate the sides with a razor blade. The sides are joined at the widest part first. Note that the four cross braces, which are those at the wing position, are all the same size. Cement them in place. At this point you may turn the fuselage upside down and pin to the plan over the top view of the fuselage. Pull the sides together at the rear and cement. A spring type clothespin is handy for holding them together. The 3/32" x ¼" nose cross braces may now be cemented in place. By pinning over the plan we can check for alignment much better than any other method. When the structure in its present condition has dried thoroughly, it is safe to remove it from the plan and add all remaining cross braces and the sheet fill-in at the nose.

The landing gear is added at this time by bending the wire as indicated on the plan and sandwiching it between two layers of 1/16" sheet with a 3/32" sheet core grooved to take the landing gear. The cross piece at the landing gear location is removed and the landing gear assembly is cemented in place with lots of cement and gusseted. The thread binding at the nose is optional, but is highly recommended, as it prevents the nose from spreading apart when taking a hard shock.

WING: Build the spar, as shown, over the plan. While this is drying, notch the trailing edge and cut out the wing ribs. To insure an accurate airfoil throughout the wing, stack the ribs together for sanding. The notch for the top spar can be cut while the ribs are stacked together; but, due to the staggering of the bottom spar, the ribs must be separated and notched as indicated on the plan. The 3/32" sheet wing tips are cut out at this time also. Now, after placing wax paper over the plans again, pin the spar to the plan to build the outer wing panel. Pin the trailing edge down and cement the wing tips in place. Fit the wing ribs by trimming from the rear to fit the notches in the trailing edge and cement in place. Cement the leading edge in place at this time, being sure to set it on edge as indicated on the plan. Last, but not least, cement the top spar in place.

When thoroughly dry, lift from the plan and repeat the same building procedure for the inner wing panels. When these are thoroughly dry, also, lift from the plan and bring them together in order to build the 1¾" wide center section between them. Block up the wing tips 3½" before building this center section. This method of wing construction is about the most accurate method of building to insure the correct dihedral angles. Complete the wing by cementing all 3/32" sheet gussets in place and by giving it a final sanding.

TAIL: The tail assembly is very simple and should prove no problem. Begin the stabilizer by cutting out all the ribs, stacking them together, and sanding and notching as you did the wing ribs. The trailing edge is notched and the stabilizer tips are cut from 3/32" sheet. Pin the trailing edge to the plan first *(Continued on page 46)*

Japanese-built English-Electric Canberra jet bomber has a single jet with unique Y-branched tailpipe to the nacelles on the wings.

PART ONE

All About PULSE JETS

by P. G. F. CHINN

Their exhaust may sound like the voice of doom—they run hotta than you know what—but they are fascinating, nonetheless. So here, for the first time, the full story.

► On June 13th 1944, exactly one week after 'D-Day' the pulse-jet engine arrived with devastating suddenness. From launching sites along the coast of Occupied France, the Germans sent V-1's against London: small explosive-laden pilotless monoplanes with a wingspread not much more than that of a large gas model, gyro-compass steered and powered by a fantastically simple and effective jet engine: the impulse-duct or pulse-jet motor, subsequently to become the prototype for the most successful model jet engine produced to date.

The V-1 engine was the first practical application of an idea conceived many years earlier—as far back as 1908, in fact, when Karavodine built a resonant-tube motor. Twenty years later, the idea was further developed by a German engineer, Paul Schmidt. To Schmidt must go most of the credit.

Schmidt began his work in the late twenties and, in April 1931, obtained a German patent for his idea. It was not until 1942, however, that the prototype of the V-1 engine finally emerged. This was then handed over to the Argus aircraft-engine concern for production.

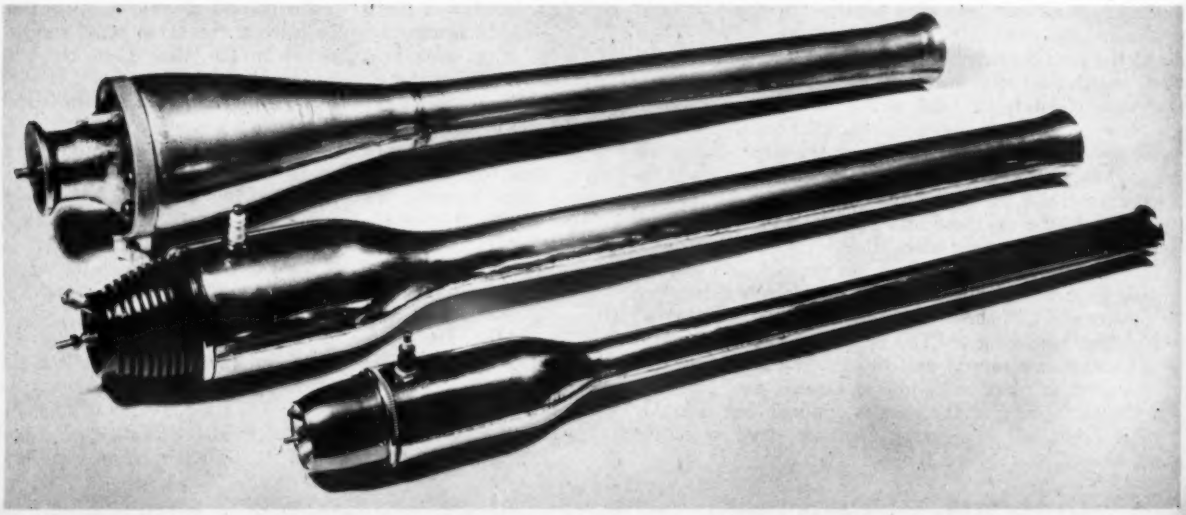
Just before the actual employment of the Schmidt-Argus engine in the V-1 weapon, a successful pulse-jet engine was also completed in the United States. This engine, the Schubert Valveless Resojet was built at the U.S. Naval Engineering Experimental Station at Annapolis. Other work on pulse-jets was also being undertaken during 1943-44 by the Aerojet Corp.

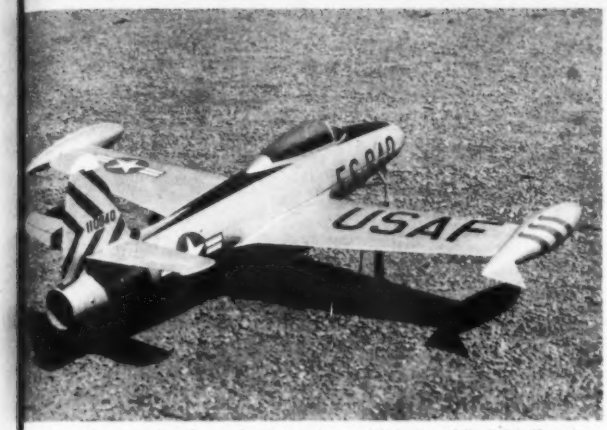
After examples of the German V-1 engine had been recovered, however, later in 1944, subsequent development was largely devoted to this engine. The V-1 engines were expendable and required an operational life of no more than half-an-hour. It was not surprising, therefore, to find that the engine had a valve life just adequate for the V-1's operational range. The aerodynamic efficiency of the valve bank too, had apparently taken second place to the need for ease of production.

American development of the V-1 engine, or PJ-31 to give it its U.S. designation, resulted in improved performance. Within two years, effective valve life had been increased to upwards of seven hours, thrust increased by 128% and specific fuel consumption reduced by 35%.

Shortly afterwards, the first model pulse-jets appeared on the market in the United States, in the shape of the Minijet and Dyna-Jet and the latter was widely copied

Most model pulse-jet engines based upon American Dyna-Jet, center. Below is smaller Japanese Tiger M.1; above M.E.W. 307, also American.





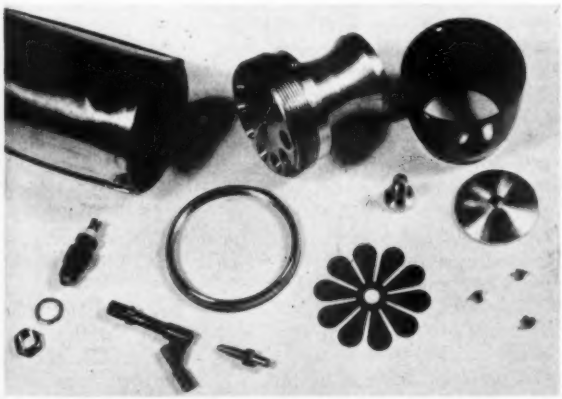
Typical example of a pulse-jet scale model is Republic F-84 Thunderjet, built from an Eureka kit. This one has Tiger L.1 engine.

elsewhere from 1948 onwards.

In the United States, much development on pulse-jets was carried out by the Marquardt Aircraft Company of Van Nuys, Calif. Prewar modelers will remember Roy E. Marquardt as an expert model builder and contestant. Today, Marquardt Aircraft employs more than 1,200 people and has an impressive record of research and development in jet powerplants, particularly subsonic and supersonic ramjets.

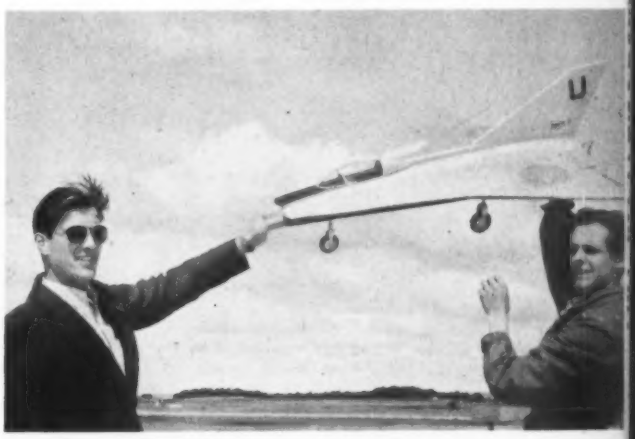
Marquardt's experiments with pulse-jets culminated in the Marquardt MA-16 pulse-jet engine as used by the Globe XKD-5G target drone. Designed to operate best at a sea-level speed of around 350 mph, the MA-16 has a maximum diameter of 10¾ in. and weighs 59 lbs. The rated maximum thrust at sea level is 180 lbs., falling to 140 lbs. at Mach 0.5. The engine is fitted with a special thrust control unit which regulates fuel flow to obtain cruise thrust (80% power) or maximum thrust as required. Unlike most pulse-jets, the MA-16 is fitted with continuous spark-ignition to permit re-ignition during flight.

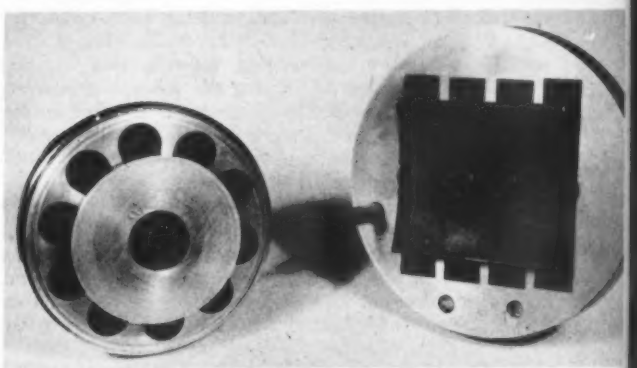
In Britain, the development of pulse-jets for helicopter rotor propulsion was undertaken by the famous flying-boat firm of Saunders-Roe. (It is interesting to note that here, too, the company president, Sir Alliott Verdon-Roe, began his career in aviation by experimenting with models —before W.W. II.) Saunders-Roe commenced work on pulse-jets in 1952 and the first unit produced was a small engine of approximately double Dyna-Jet size. Maximum diameter was 5½ in., length 47½ in. and weight 15½ lbs.



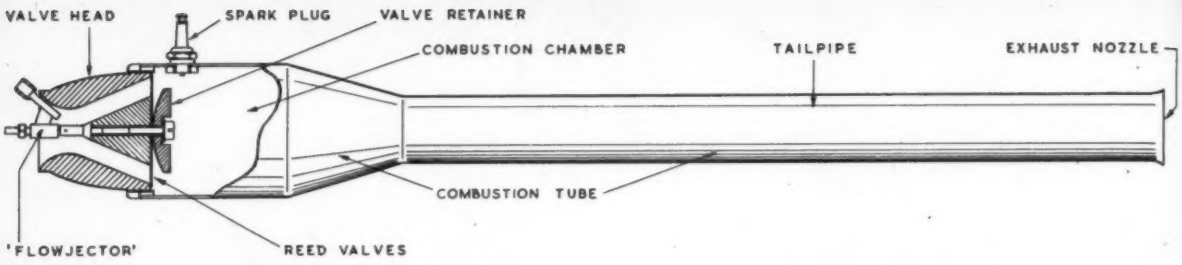
Tiger M.1 baby jet has ten-port valve-head like its bigger brother. It has the spun-aluminum cowl which replaces usual head fins.

Tests prior to building of Sweden's SAAB J35 supersonic fighter included flights with 1/7 scale pulse-jet engined models. Below—one of the test models. Pulse jet had 5½ pounds of static thrust.

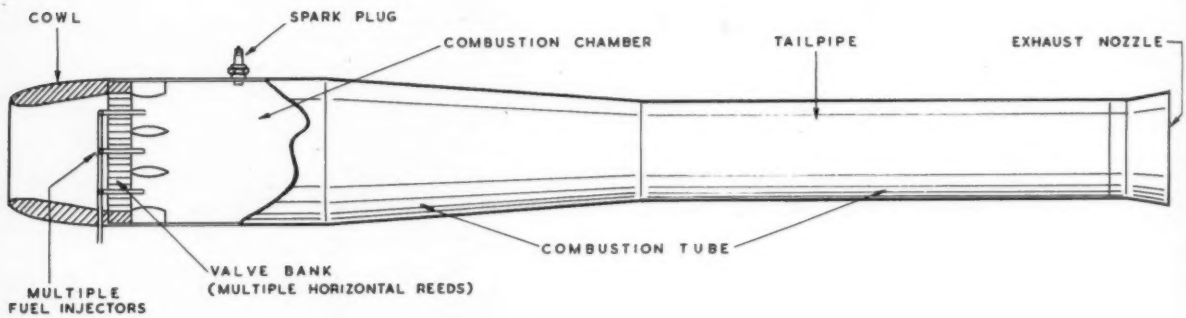




Most model jets feature Dyna-Jet type radially ported head, shown on the left. An exception is M.E.W. 307 with eight squared ports.

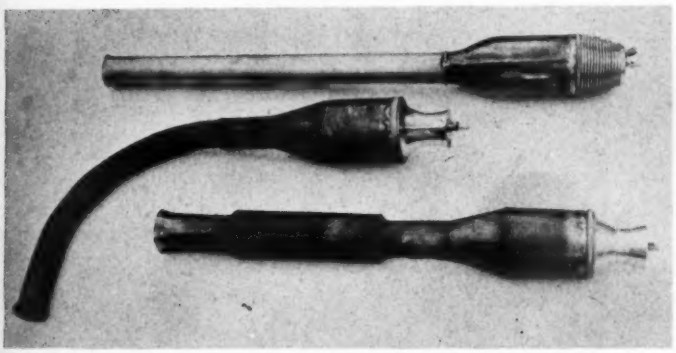


TYPICAL MODEL PULSE-JET OF THE DYNA-JET TYPE

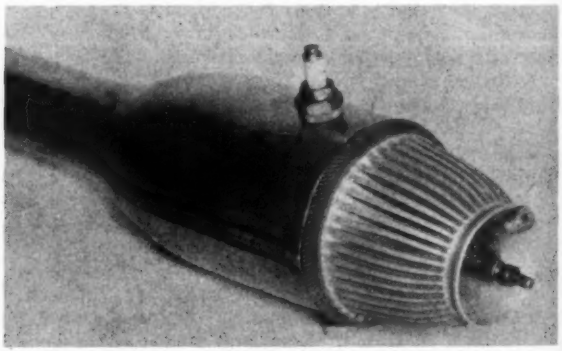


TYPICAL FULL SCALE PULSE JET OF THE SCHMIDT-ARGUS TYPE

P·G·F·CHINN



Japanese Eureka jet and two experiments by Goro Hagiwara. Eureka has four-port head. Lower model is attempt to shorten tailpipe.



O.S. Type 1 pulse jet. Forerunner of present model, set Japanese record of 141.2 mph, back in 1952. Jets for experienced modelers.

All About Jets . . . *Continued*

Operating frequency was approximately 130 cycles per second giving a maximum static thrust of 45 lbs. Starting ignition was via a model spark plug or glowplug and thrust was controlled by varying the amount of fuel admitted. The engine achieved the quite creditable fuel consumption figure of 2 lbs. per lb. static thrust-hr. at 80% throttle. This engine formed the prototype for the 120 lb. s.t. Saunders-Roe pulse-jet later produced.

The Marquardt and Saunders-Roe pulse-jets, like the Minijet, Dyna-Jet and all the latters' imitators, have all followed the original German conception in their use of mechanical (reed) non-return valves at the forward end. In France, however, various developments of the Valveless Resojet originated in America have been produced by the noted SNECMA aero-engine company.

The first of these (1950) was a small unit weighing 10½ lbs. and giving a thrust of 22 lbs. and called the Escopette (Carbine). Several hundred flight tests have been made by sailplanes fitted with either four or six of these little motors. A characteristic of this type of "acoustical" pulse-jet is its rather excessive length and a more recent SNECMA development is the Ecrevisse in which the whole unit is bent double into the shape of a narrow "U" laid on its side, so that the intake faces aft above the jet orifice. Pulse frequency is 60 c.p.s. and a thrust of 44 lbs, is obtained for a weight of 13.2 lbs. A larger, 66 lbs. s.t. Ecrevisse is also made and a consumption figure of 1.35 lbs.-lb. thrust-hour is claimed which, it will be noted, is a substantial improvement on the figures realized with other types of pulse-jets, models included.

Obviously, model aeronautics has a link with full scale aviation through the pulse-jet and seldom has this been more clearly demonstrated than by the SAAB Aircraft Company in planning the SAAB J.35 Dragon supersonic delta fighter for the Royal Swedish Air Force. Here, the preliminary test program *(Continued on page 62)*

Let's Get STARTED

by I. N. STRUCTOR

PART TWO

Unbreakable props make allowances go further. This three-blader is nylon. Little props safe for small fry. Most free-flight models crack up because they are too small for the engine.

From sheet-balsa gliders and the ready to fly jobs, it can be tough to progress successfully into built-up free flying models—but our old timer has a few tricks up his sleeve!

►From sheet-balsa sides and bulkheads and sheet wings, how does one get to a flying model with built-up construction where pieces have to be cemented together, like ribs in a wing, and the whole covered with tissue? This is the crossroads. You give up, or you become a modeler.

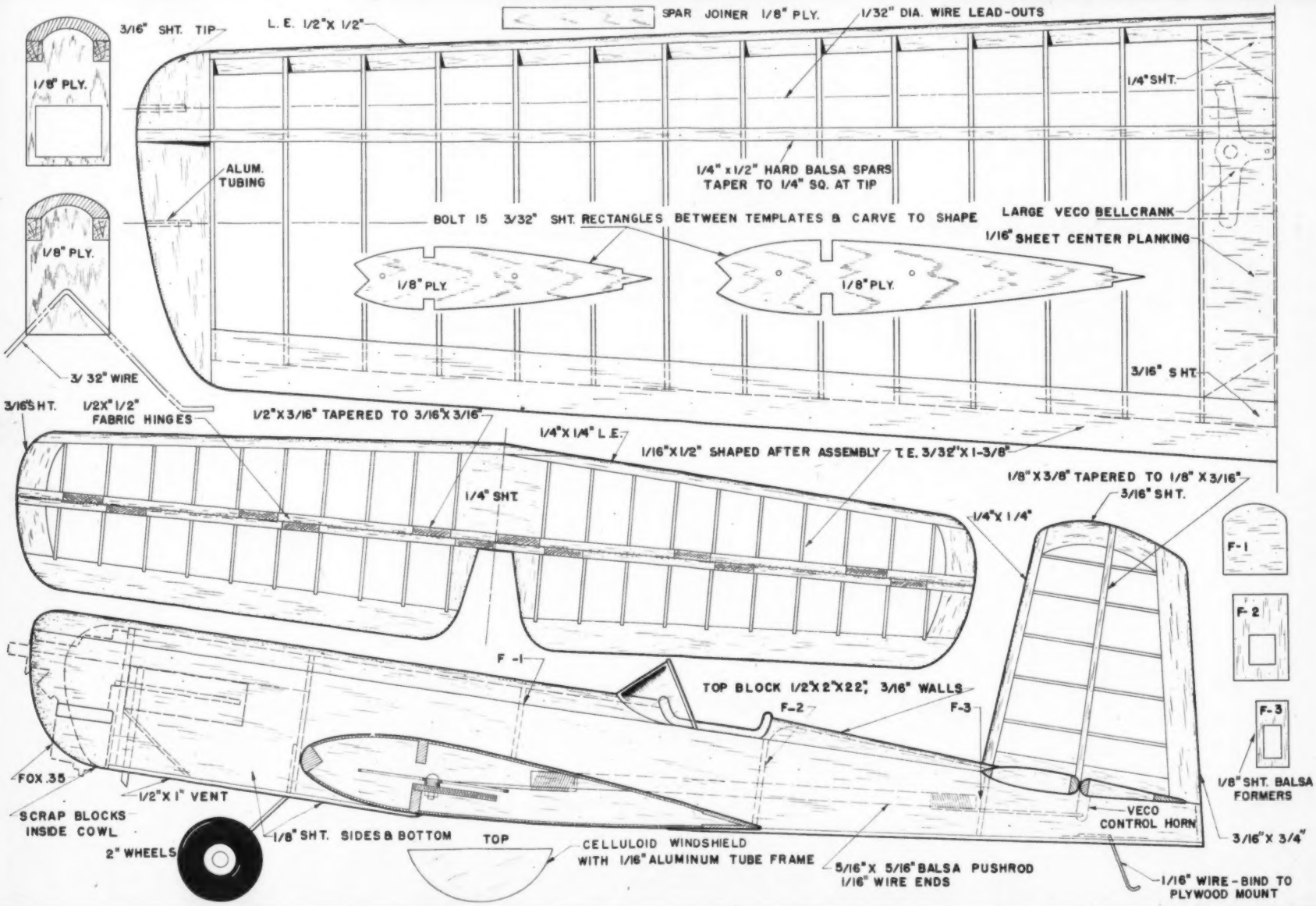
Some fine airplanes are hidden in those boxes at the dealers. A great success with our gang was the Midwest Sniffer. Hardly a howling success with the trade, the Sniffer deserves a better fate. It has a sheet balsa-sided fuselage but built-up flying surfaces, thus combining the prefabbed construction of the Dakota sort of thing with a fair amount of handwork. The Sniffer is another oldie. Wally Simmers, once one of the greatest of contest fliers, designed it. With an easy going .049, the Sniffer is a fine sport design. For small engines, models like the Berkeley Powerhouse (.02 engine) will fill in.

It is a misconception that modelers demand the high powered rip-snorting contest types which almost certainly are smashed by anybody but an expert—even he has occasional disasters. Unless you plan flying in a contest and know about contest models, it is better not to buy such kits. If you are lucky enough to fly the contest design successfully, it will have such tremendous altitude grabbing performance and gliding ability that it will drift out of anything but an airport. Contest models are thermal happy. Losing a model the first time in the thermal is exciting—but is it worth it? The sport model—like the Sniffer, is very stable, not overpowered, and offers maximum chance for success and satisfaction. It, too, can be lost but chances of an out-of-sight flight are reduced.

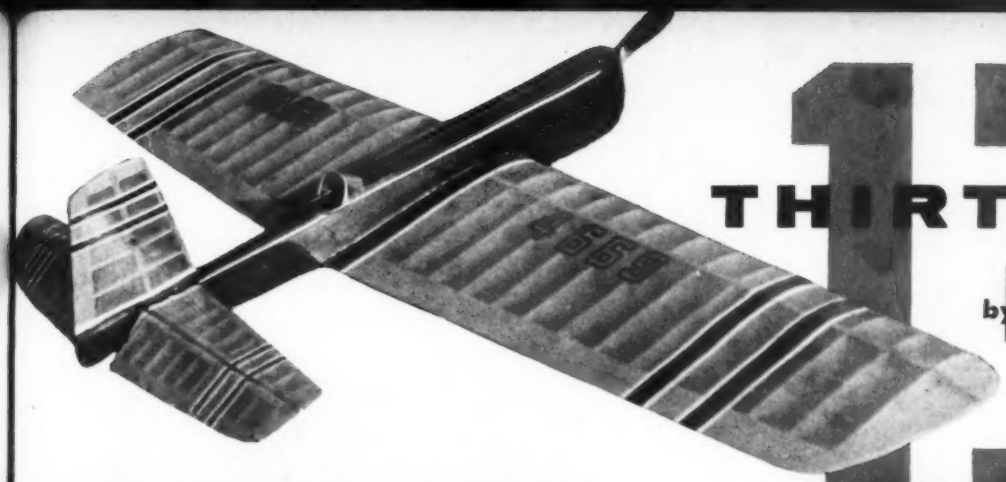
Another reason why even sport models fail the average builder is kit manufacturers have never readjusted their ideas to allow for the vastly increased power of today's Half A engines. With the newer, more powerful engines, the Thermal Hopper, the Shriek, etc., every fault in construction (such as minute warps) and adjustments are disastrously magnified by the high climb and fast flying speed. With the older Cub .039, the Spitfire .045 (if you remember it!) the Sniffer (and similar models) was a mighty pretty flier. It was exciting, and still safe, with the older and lower-powered .049's. It probably will fly realistically on the new Cox .02.

In the sport type of free-flight with .049 power, the beginner should keep in mind that all these models are overpowered because they have been rendered too small by progress in engine design. The common mistake, therefore, is to want the most powerful engine. The bronco can be broken, so to speak, by various tricks. Always run the engine rich. That is, open the needle valve until the engine sounds ragged and has a smokey exhaust. This reduces power. Or put the prop on backwards. This reduces thrust by about one-third and is the equivalent of using a smaller engine. Or do both, if necessary—always on first test flights. A heavier model becomes sluggish so, with power to spare, feel free to build heavy—but keep the tail end light. Here's chance to put on that colored dope—but do hand glide first to see if the ship has become tail heavy. Most of the surface is behind the proper balance point so paint will weigh down the rear end. If this happens, cement a piece of lead or other ballast inside the nose for proper trim.

How about that covering? The all-balsa body or other sheet balsa surfaces do not require paper covering. To cover the built-up wing and tail, follow this procedure. The Sniffer wing, for example, has "polyhedral." A wing with the uptilted halves joined at the middle has a "dihedral" angle. The "polyhedral" wing has three breaks or joints, rather than one. The tips are tilted up, at a point well out on the span; and the wing halves are tilted up from the center. Cut one piece of tissue, grain spanwise for the bottom of the wing, leaving about one inch extra material to hang out around all the edges. The top surface will require four pieces, one for each straight portion between the joints. Makes no difference which is covered first, top or bottom. But if this is your first (*Continued on page* 40)



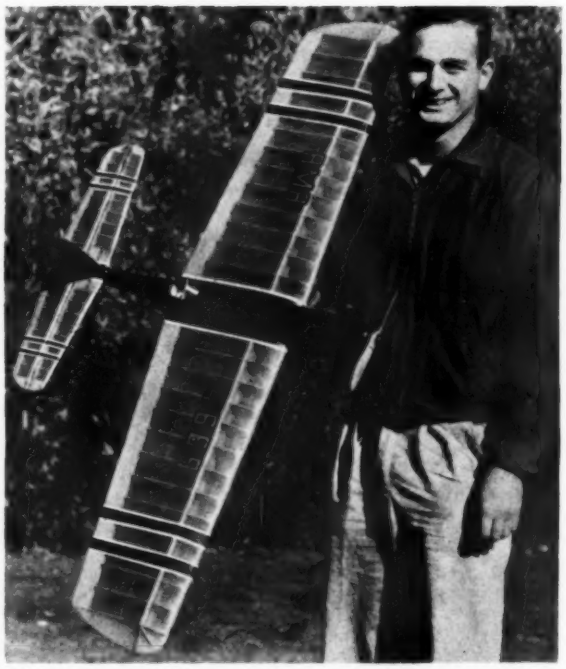
FULL SIZE PLANS AVAILABLE. SEE PAGE 56.



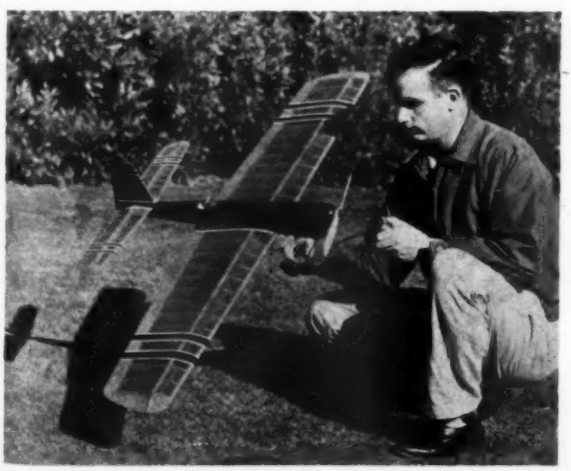
THIRTEEN

by JOHN RITNER

Long-span stunter for .29-.35' engines has impressive rack-up of wins on the coast. Outstandingly easy to fly through stunts.



"We." Ritner flies clockwise because prop slipstream against fin eliminates a need for offset rudder. Note built-up tail surfaces.



Three-to-one methanol and castor, with a dash of nitro on a cold day, is Ritner "brew." Model can be flown stiff arm, ala beginner.

► The Thirteen is the end product of a long series of stunt models. All of these models were of the same general design; long tail-moment arm, medium length nose-moment arm and slightly above average size. The Thirteen in the photos is five years old and has consistently been a winner in W.A.M. Contests. It weighs 24 ounces and flies 75 mph on 60-foot .012 lines with a Fox .35 running a 10 x 6 prop. This basic design flies level with almost no corrections from the pilot, yet it is capable of very tight maneuvers, due to the light wing loading. Square eights, triangular eights, you name it, they are a snap with this model.

Construction is simple, even with a tapered wing, so don't let this part scare you away. These instructions are set up so that you can build straight through; that is, one part will be drying while you are building others. It took me three days from start to first flight.

The model was built for the first Plymouth Internationals which was the only meet in which the design failed to place. I did not have the cooling duct then and the engine overheated. I have flown in all types of weather since I installed the duct and have had no cooling problems.

Select some quarter grained medium weight ⅛" sheet for the fuselage sides and cut them to the specified shape. Cement the motor mounts to each side and set aside to dry. Make two ⅛" plywood rib templates, one tip, and one center. Cut 25 rectangular pieces from 3/32" sheet and bolt these between the plywood templates. Cut the balsa down to about 1/16" from the plywood all around with a long sharp knife. (The family butcher knife well sharpened works extremely well.) Sandpaper the balsa down to the plywood, cut the spar notches and you have the ribs for one half of the wing. Repeat this procedure for the other half. Drill the holes for the lead wires while the ribs are stacked together.

Return to the fuselage and join the two sides with the firewall and first bulkhead. Do not forget to cut the hole in the firewall because your engine will overheat unless a good way to cool it is provided.

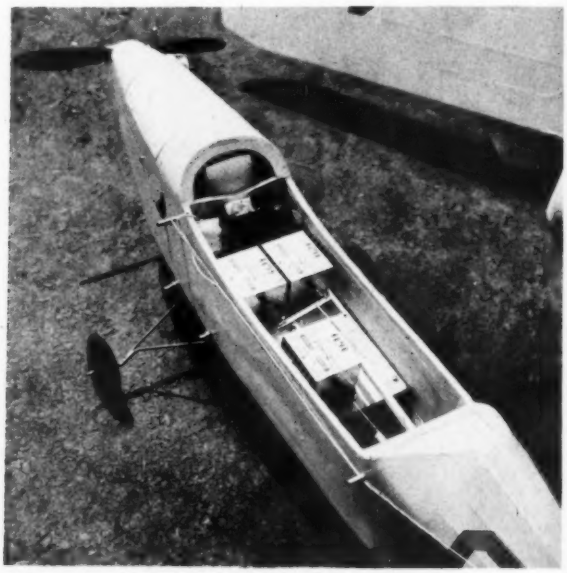
While the fuselage is *(Continued on page 50)*

radio control

at the Nationals

PART TWO. ***Winding up discussion of RC ships at the Nats are these notes on brakes, flaps, and other design features seen at this biggest event.***

Event with future, pylon racing. Keith Storey's winner patterned after Wittman's famous Bonzo. Rigid rules prevent high speed.



Had two coupled servos (4 channels) for trim, plus full flipper movement. Note streamlined wheels, the knock-off landing gear.

by DORIS and ED YULKE

► Ailerons were the only new control or feature on the ships at this years Nats but the things some of the fellows accomplished with escapements, servos and the like were sure eye-openers. We'll try to give you the highlights.

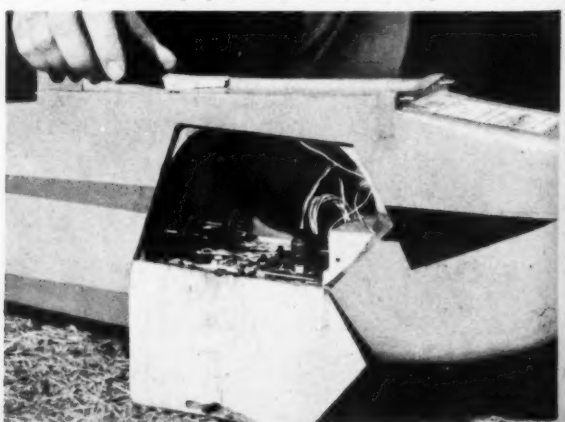
George Kilbey's F-3 Waco had silvery rigging "wires" made from the flat plastic craft materials for weaving. The plastic strip, about ⅛" wide and less than 1/16" thick, not only made the most realistic streamlined flying wires, but it also prevented interference with the radio—a probability with "real wires." The stretch of the tape allowed for a certain amount of stretch in landing shocks. Real wire would have torn the fittings out.

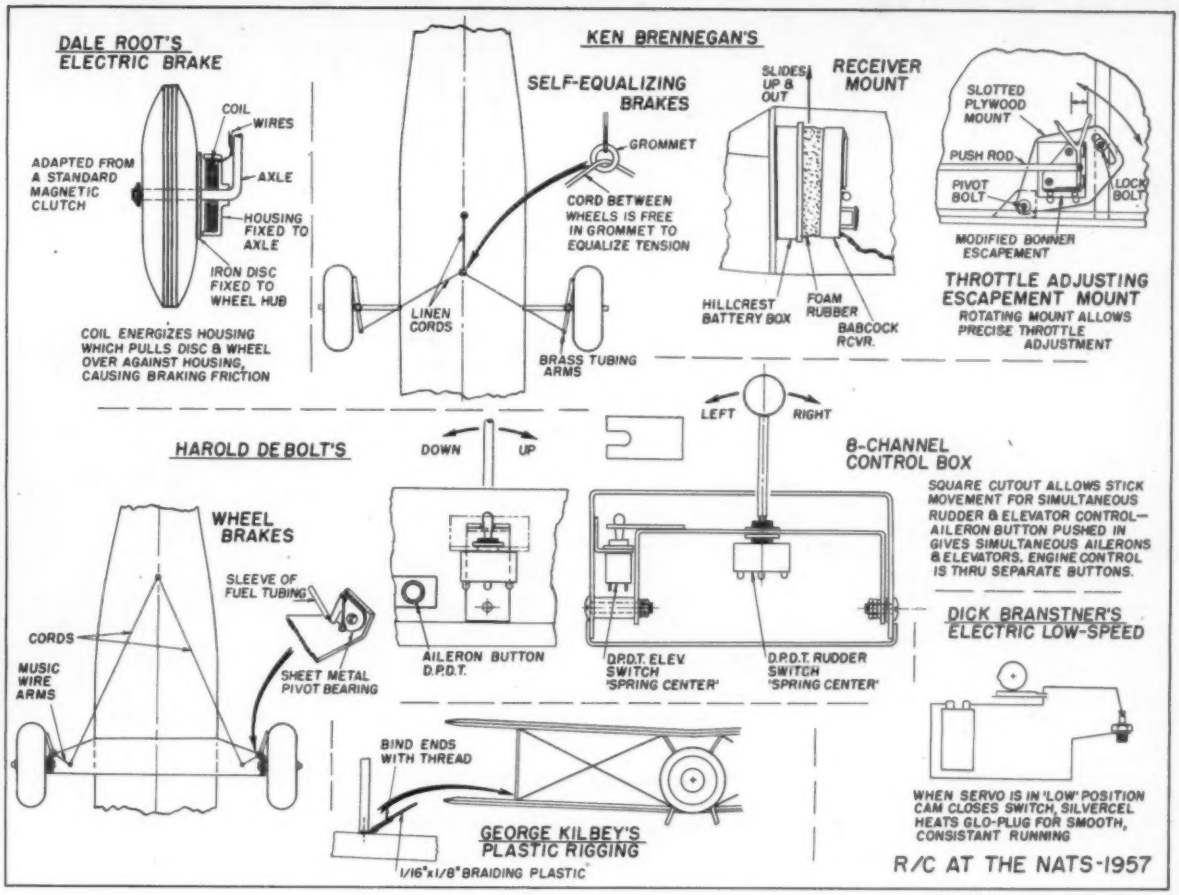
The worst problem in trying to get a glow engine to idle down is that it needs a rich mixture. Give it all the "juice" it needs and the glow plug won't burn through and ignite the juice, hence uneven idling, with a good chance of the engine conking out when you least expect it. Dick Branstner's ship sported a Silvercel hooked to a switch that "turned on the heat" on low power, had his engine running so smooth it was hard to tell in the air whether the engine was idling or had conked out.

For the boys who were after the "race-car" points (ground handling), there were brakes of a number of types. The smoothest working mechanical brakes we saw

Plastic squeeze bottles still made best all-round tanks for the functional multi-jobs, as seen on this Bonner-designed Smog Hog.

Most noted proponent of the proportional systems is Walt Good—Multi Bug here displayed. Pulse actuators subject themselves.



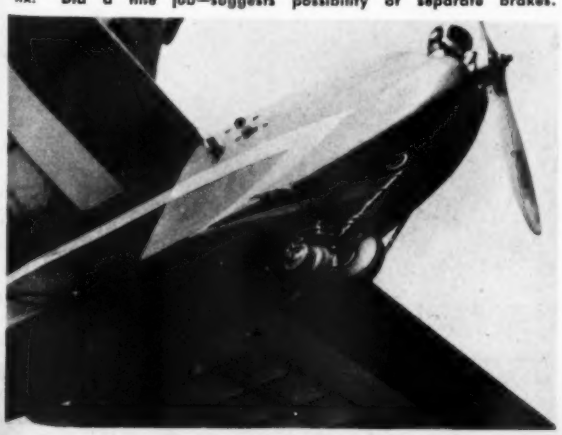


were on Ken Brenegan's ship. Two levers on the landing gear pressed against the tires when a cord between them was pulled. An eyelet on this cord was attached to a cord running up into the airplane to the actuator. No worry here about one brake working, the other not—they were self equalizing. Ken's brakes were actuated by the pulse drive motor for the rudder. "No signal" wound the motor up, wound up the end of the cord and pulled the brakes on, while normally (brakes off) the motor pulsed and gave proportional control to the rudder.

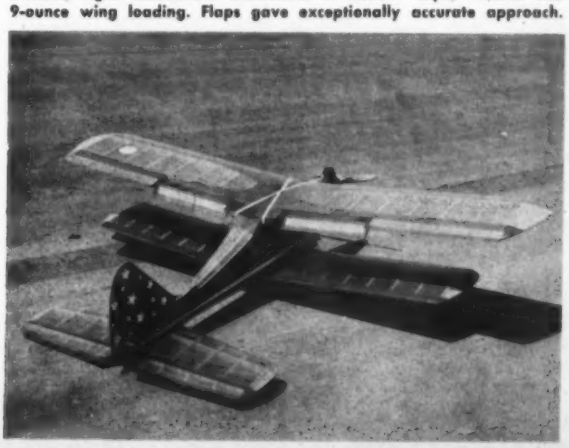
Ever try to get a push rod adjusted for the proper low-speed position on a throttle? Ken came up with a swiveling platform for the escapement, a modified Bonner SN for three positions, low, cruise, high. The key to this adjustment is the fact that the escapement swivels around one mounting bolt, the other bolt sliding in a slot. Lock the bolt in the slotted hole wherever you want the throttle for idle. Since the high-speed opening position on the throttles is not critical, the slight adjustment on that end when you adjust the idle doesn't affect the power from the engine. On his Torp .15, Ken used a Bramco with no thought that the hole would be too big! All you have to do is close down the barrel in the high-speed position to what you need for the .15!

Getting back to wheel brakes again, the most important single development we saw (*Continued on page* 48)

Magnetic nose-wheel brake on Dale Root's Ascender was temporary "fix." Did a fine job—suggests possibility of separate brakes.



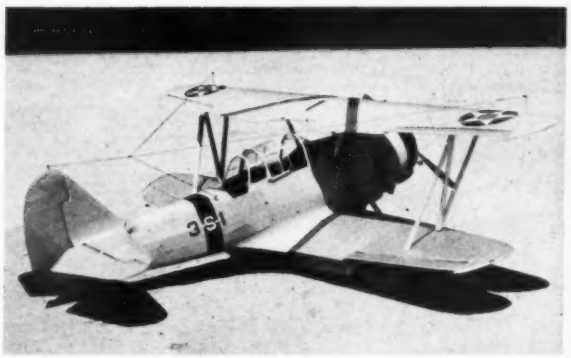
Smooth, tight maneuvers unexcelled in deBolt "Bipe," which has 9-ounce wing loading. Flaps gave exceptionally accurate approach.



Vought SBU-2

by DAVID BRAZELTON

Posed on the wing of a modern jet, with its designer, model of the vintage Vought makes an interesting study in old-style design.



Authentic markings of the day enhance the scale placement of ribs, stringers, wires, and so on. "Green house" cockpit, noteworthy.

The last of the historic Vought biplanes makes a unique project for control-line scale fans. Performs well with your favorite .19 to .29.

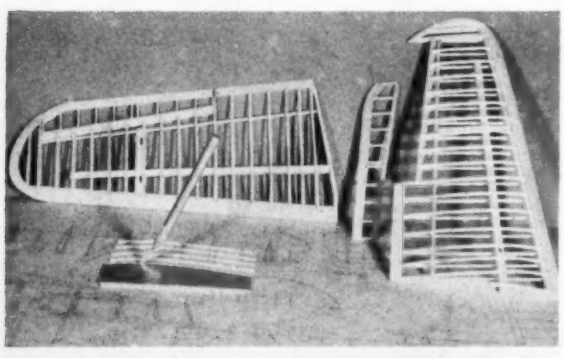
► The last and probably the prettiest biplane built by Chance Vought was the SBU-2. It was used both as a scout and a dive bomber and was one of the first aircraft equipped with cowl flaps. It was powered with a Pratt and Whitney, R-1535, Twin Wasp Jr. engine, rated at 750 hp. It was of all-metal construction with fabric covering on the wings, fuselage, and tail surfaces. It cruised at 169 mph with a top speed of 205.

The model presented here is intended to faithfully reproduce this airplane. The fabric surfaces are authentic and with a little attention to detail, a very striking model can result.

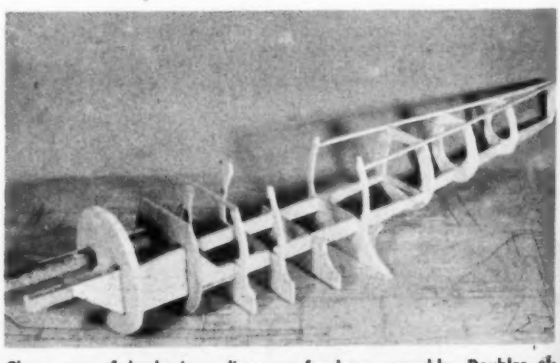
Don't let the built-up tail surfaces or the two-piece wing ribs scare you. In the case of the wing ribs you will find that this type of construction is much faster and easier than any other method of cutting ribs for a tapered wing. The way the ribs are built in the tail surfaces is as easy as carving out of sheet balsa and much more authentic. For the contest builder there is a three view of this airplane in The Aircraft Yearbook for 1938, page 336.

TAIL: I always start on the tail surfaces because I like to build them the least. Cut the vertical fin from ⅜" sheet balsa and sand the leading edge to streamline shape. The rudder is built by assembling the ⅜" balsa leading edge and the trailing edge outline as shown in the plans. Then place in position strips of 1/16" balsa, ⅜" wide, at the intervals shown on the plan for ribs. When the cement is dry, the ribs can be cut to shape as if you were carving from balsa. Round the leading edge and cement to the fin with the rudder trimmed about 5° to the right.

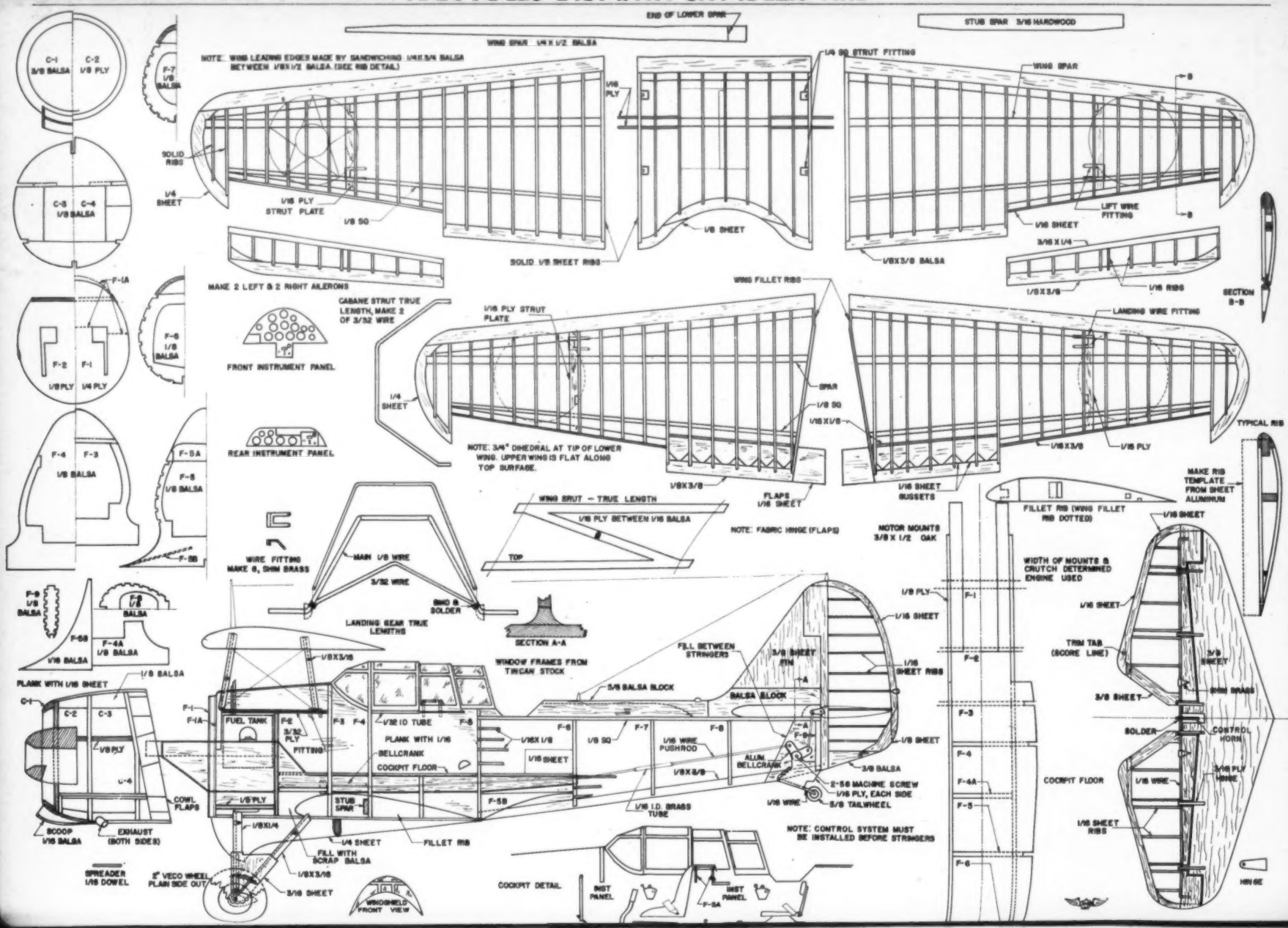
Construction of the horizontal stabilizer looks a little tricky because of the scale hinging. I found that it built the easiest right in my hand. Start the construction by cutting the horizontal stabilizer (*Continued on page* 54)

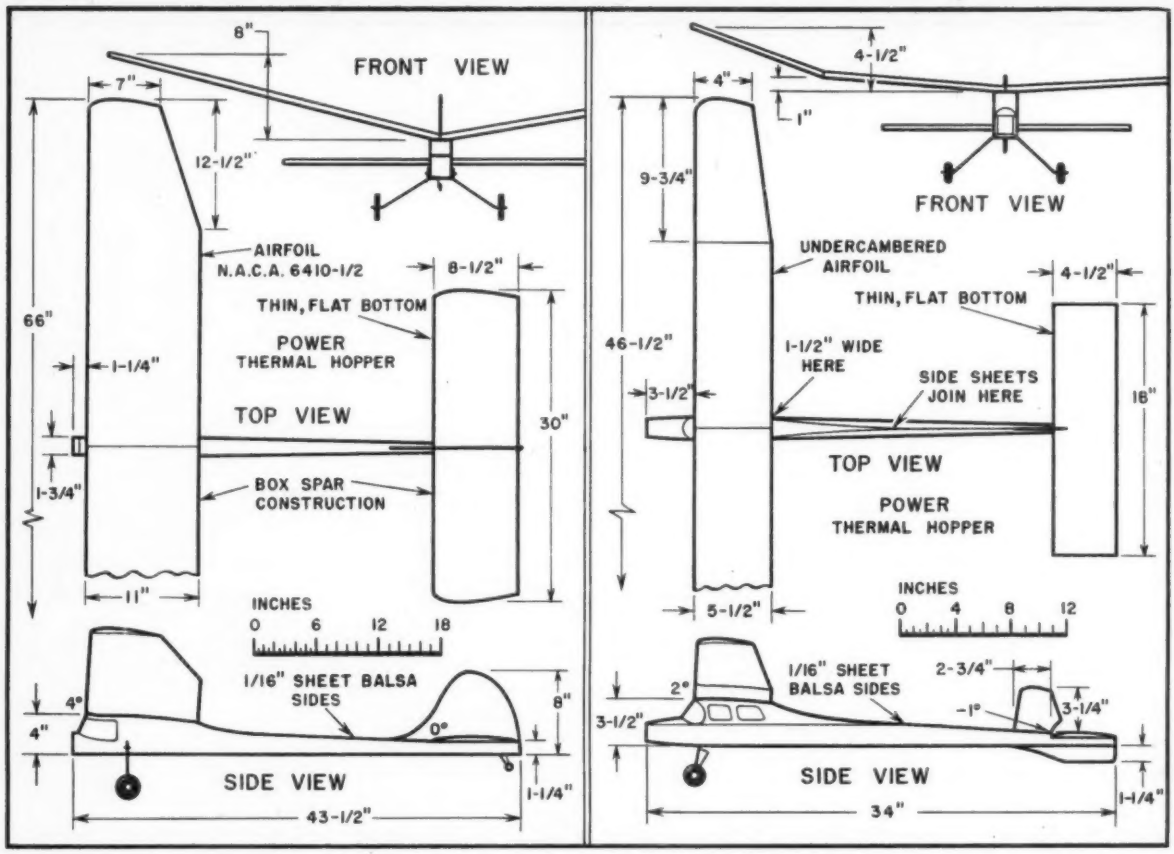


Using a template, rib pieces are sliced out, trimmed to length to suit tapering panels. Much easier than making many different ribs.



Clever use of keel pieces lines up fuselage assembly. Doubler effect reinforces motor mounts. Interior details before planking.


FULL SIZE PLANS AVAILABLE SEE PAGE 54
C-1 3/8 BALSA
C-2 1/8 PLY
C-3 1/8 BALSA
C-4 1/8 BALSA
F-1A
F-2
F-1
1/8 PLY
1/4 PLY
F-7 1/8 BALSA
F-6 1/8 BALSA
F-4
F-3
1/8 BALSA
F-5A
F-5
1/8 BALSA
F-5B
F-8 1/8 BALSA
F-5B
BALSA
F-4A 1/8 BALSA
1/8 BALSA
PLANK WITH 1/16 SHEET
1/8 BALSA
C-1
C-2
C-3
1/8 PLY
C-4
COWL FLAPS
SCOOP 1/16 BALSA
EXHAUST (BOTH SIDES)
SPREADER 1/16 DOWEL
2" VECO WHEEL PLAIN SIDE OUT
1/8X1/4
1/8X3/16
3/16 SHEET
WINDSHIELD FRONT VIEW
NOTE: WING LEADING EDGES MADE BY SANDWICHING 1/16X3/4 BALSA BETWEEN 1/8X1/2 BALSA (SEE RIB DETAIL)
SOLID RIBS
1/4 SHEET
1/16 PLY STRUT PLATE
1/8 SQ
MAKE 2 LEFT & 2 RIGHT AILERONS
END OF LOWER SPAR
WING SPAR - 1/8 X 1/2 BALSA
1/16 PLY
1/8 SHEET
SOLID 1/8 SHEET RIBS
1/4 SQ STRUT FITTING
WING SPAR
LIFT WIRE FITTING
1/16 SHEET
1/8X3/8 BALSA
STUB SPAR 3/16 HARDWOOD
3/16 X 1/4
1/8X3/8
1/16 RIBS
SECTION B-B
CABANE STRUT TRUE LENGTH, MAKE 2 OF 3/32 WIRE
FRONT INSTRUMENT PANEL
REAR INSTRUMENT PANEL
WING FILLET RIBS
1/16 PLY STRUT PLATE
1/4 SHEET
SPAR
1/8 SQ
1/8X1/8
1/8X3/8
NOTE: 3/4° DIHEDRAL AT TIP OF LOWER WING. UPPER WING IS FLAT ALONG TOP SURFACE.
FLAPS 1/16 SHEET
LANDING WIRE FITTING
1/16 SHEET GUSSETS
1/16X3/8
1/16 PLY
TYPICAL RIB
MAKE RIB TEMPLATE FROM SHEET ALUMINUM
WING STRUT - TRUE LENGTH
1/8 PLY BETWEEN 1/16 BALSA
TOP
NOTE: FABRIC HINGE (FLAPS)
WIRE FITTING MAKE 6, 5MM BRASS
MAIN 1/8 WIRE
3/32 WIRE
BIND & SOLDER
LANDING GEAR TRUE LENGTHS
SECTION A-A
WINDOW FRAMES FROM TWICAM STOCK
MOTOR MOUNTS 3/8 X 1/2 OAK
WIDTH OF MOUNTS & CRUTCH DETERMINED ENGINE USED
FILLET RIB (WING FILLET RIB DOTTED)
1/16 SHEET
TRIM TAB (SCORE LINE)
3/8 SHEET
5MM BRASS
SOLDER
CONTROL HORN
3/16 PLY HORN
1/16 WIRE
1/16 SHEET RIBS
COCKPIT FLOOR
1/8X3/16
FUEL TANK
F-2
3/32 PLY FITTING
F-3
F-4
3/32 I.D. TUBE
F-5
PLANK WITH 1/16 SHEET
BELLCRANK
COCKPIT FLOOR
1/8X1/8
F-6
1/8 SQ
F-7
F-8
1/16 SHEET
1/16 WIRE PUSHROD
1/8X3/8
ALUM. BELLCRANK
STUB SPAR
F-5B
1/16 I.D. BRASS TUBE
1/16 WIRE
FILLET RIB
1/4 SHEET
FILL WITH SCRAP BALSA
FILL BETWEEN STRINGERS
3/8 SHEET FIN
1/16 SHEET RIBS
3/8 SQ BALSA BLOCK
BALSA BLOCK
1/8 SHEET
3/8 BALSA
2-56 MACHINE SCREW
1/16 PLY, EACH SIDE
5/8 TAILWHEEL
NOTE: CONTROL SYSTEM MUST BE INSTALLED BEFORE STRINGERS
COCKPIT DETAIL
INST PANEL
F-5A
INST PANEL
1/8 PLY
1/16 SHEET
F-1
F-2
F-3
F-4
F-4A
F-5
F-6



One of the greatest weight lifters of them all, C. O. Wright's Cargo Clipper, left. Cliff Montplaisir's American Class PAA-Load winner.

Seen at the Nats

by PAUL E. DEL GATTO

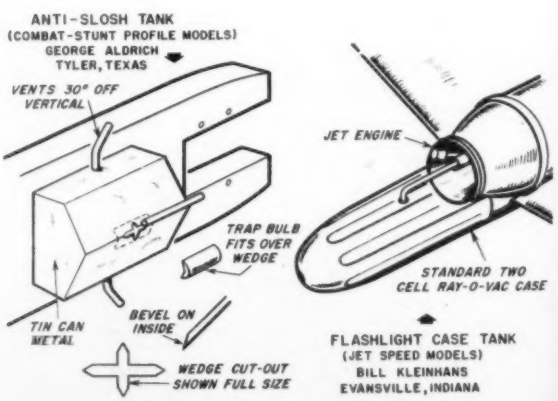
Hundreds of outstanding ships, and perhaps thousands of ideas, could be seen at biggest meet. Four pages give the idea.

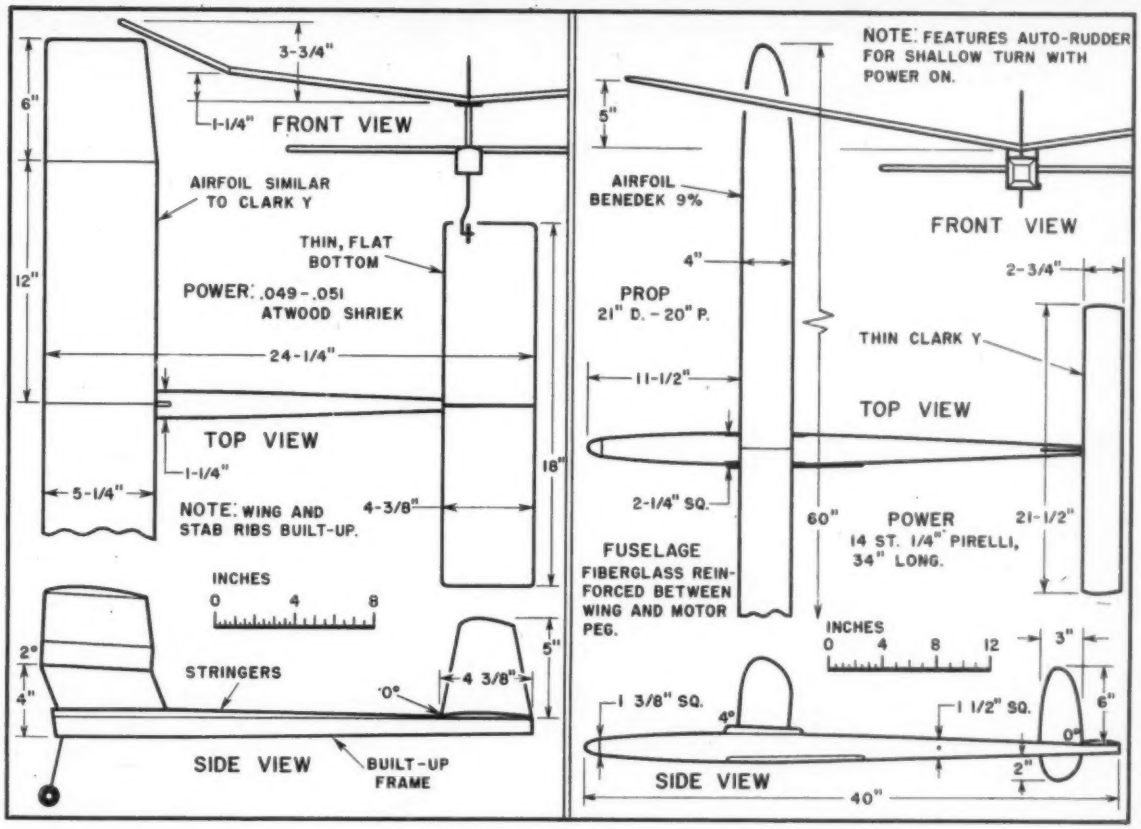
► Trudging our madcap merry way from dawn to dawn, from hangar to field and back to the hangar again we were able to get a good picture of the keen activity that prevailed at the 1957 Nationals.

Three things impressed us very much this year: original designs, functional construction, and juniors flying like old pro's, making their papas look like novices. To top it off, many juniors showed skill in building and design that would make some old-timers turn green with envy.

From our own observations, it was apparent that the average model designer had shed many of his ideas of free-flight streamlining and highly experimental developments. Most designers focused their attention on straightforward, standard designs which could be easily fabri-

The free flight designers for the most part focused their attention on straightforward creations that obviously were easily fabricated.



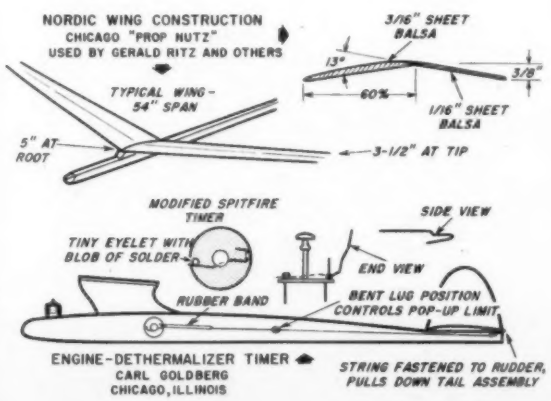


Jack Byrne's Lean-To, typical of the fast-climbing functional Half A's in free flight. Right—Don Gurnett's Limited, and Wakefield.

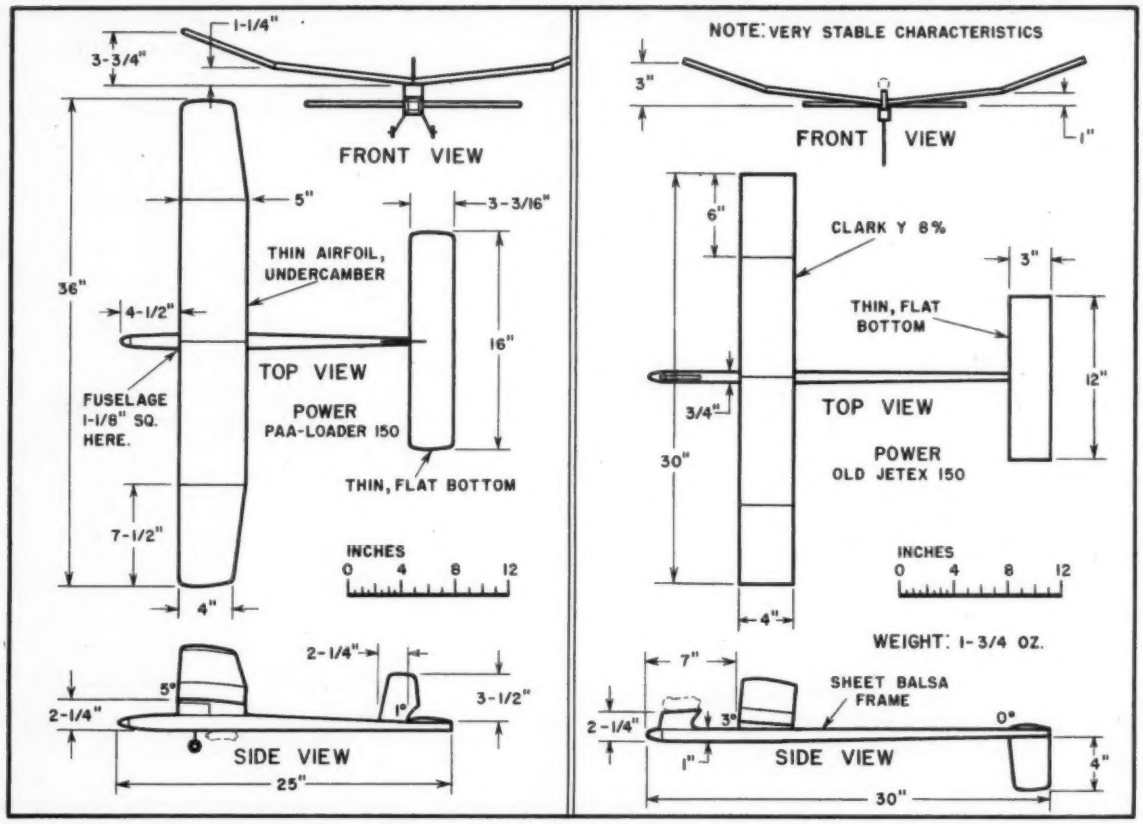
cated (some of which were built in the hangar) and quickly flown.

Contrary to free flight, streamlined models did prevail in the control-line circles. This, of course, was to be expected, particularly in the speed events. Even in the stunt circles, the streamlined and clean-looking stunt designs set the pace for others to follow. Combat on the other hand was logically overwhelmed with rugged, easily constructed models which were fast and very quick to respond to the controls.

We managed to jot down a few items of interest and compile some worthwhile three views which represent an excellent cross-section of what was seen at the Nationals, and what was of *(Continued on next page)*



Clean looking stunt models abounded in precision aerobatics. The urge to be different shows in minor ways, like wing tips here.



Fred Pearce's first-place PAA Load jet winner, designed by Woody Blanchard. Right—Rudy Kluiber's winner of new rocket power event.

interest to many other model builders who were there. Some selections placed high in the events in which they were entered. Others selected also had the potential but not the luck element. More important though, they reflected creative design ingenuity to a very high degree.

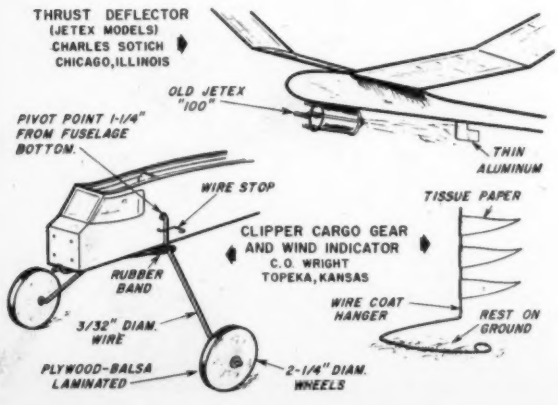
C. O. Wright's Cargo design is an excellent example. Its well thought out construction and design details left little to be desired. The only thing Mr. Wright did not possess that eventful day was that sorely needed element of luck. A victim of "spectatoritis," the model was damaged beyond immediate repairs during landing. This was after a successful test hop with 35 oz!

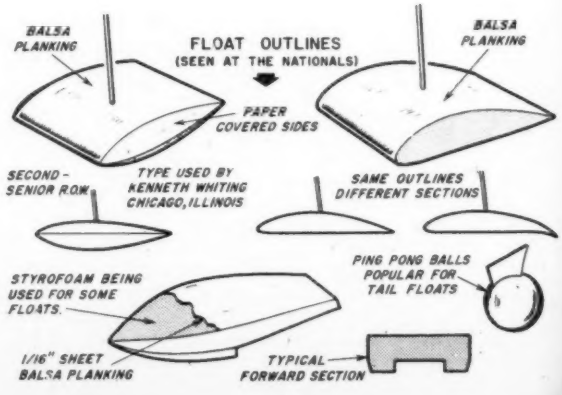
Cliff Montplaisir, a man to watch at any meet, came through with a first in ½ A PAA-Load. The design was well thought out and excellently done. But that's what you can always expect from Cliff.

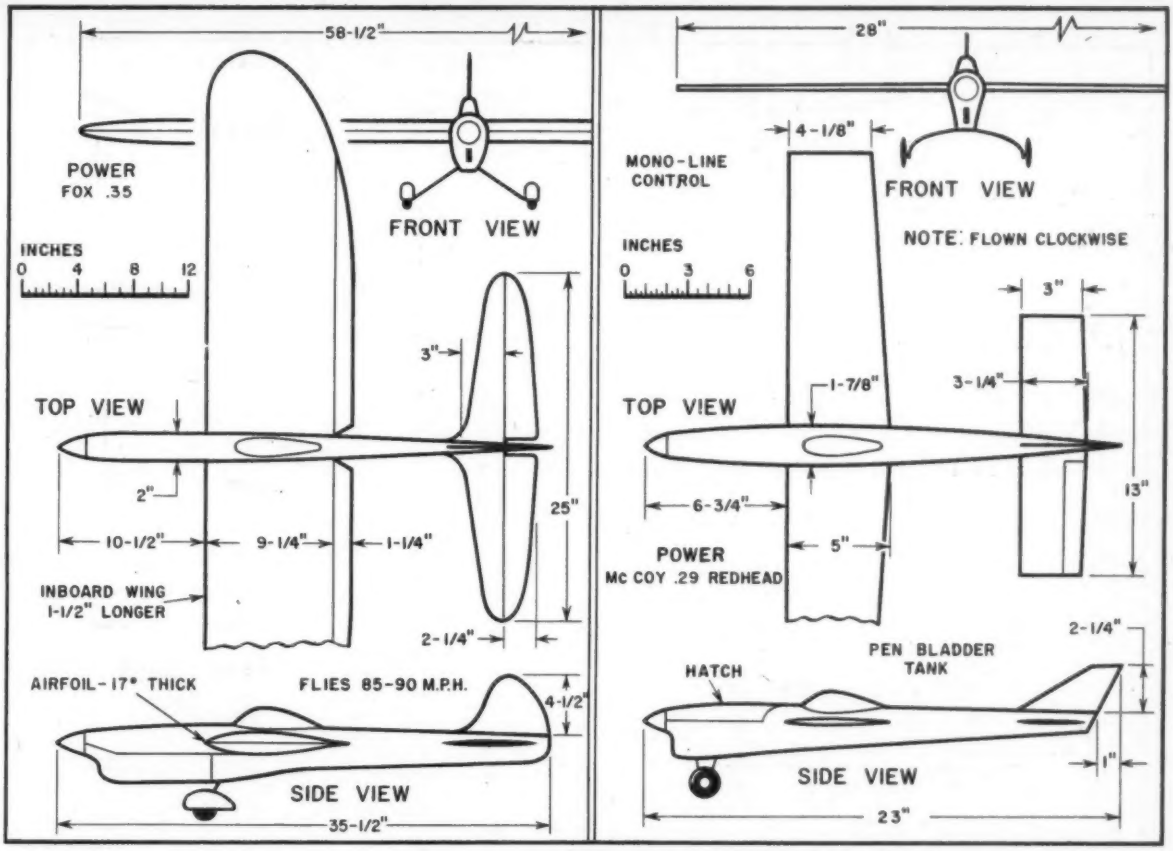
We look for Donald Gurnett to set the pace in many aspects of design in future years. His numerous wins this year enabled him to take home the coveted Senior Championship. A modest, serious and creative model builder, who with Larry Conover's able assistance, coupled with his own design ability; proved to be an unbeatable combination. Evidence of this was his 2nd place winning design in Limited Rubber and Wakefield.

One of the fastest climbing ½A free flights was Jack Byrne's Lean-To. Had it not been lost O.O.S. it might have been in serious contention for top awards.

The jet- and rocket-powered events provided many




BALSA PLANKING
FLOAT OUTLINES (SEEN AT THE NATIONALS)
BALSA PLANKING
PAPER COVERED SIDES
SECOND-SENIOR R.O.W.
TYPE USED BY KENNETH WHITING CHICAGO, ILLINOIS
SAME OUTLINES DIFFERENT SECTIONS
PING PONG BALLS POPULAR FOR TAIL FLOATS
STYROFOAM BEING USED FOR SOME FLOATS.
1/16" SHEET BALSA PLANKING
TYPICAL FORWARD SECTION

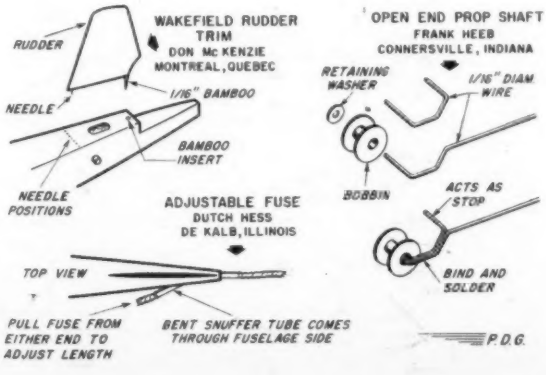


Sleek high-speed stunter, Dick Brewer, left. with small flaps and camber high point at 48%. Right—Smith-Steegens Proto Winner great.

exciting moments and a high in original design. Fred Pearce's first place win in Jet PAA-Load helped considerably towards bringing the Club Championship to the Brainbusters, of Hampton, Va. The model was designed by Woody Blanchard, a three-time National Champ himself!

Rudy Kluiber's original design which placed first in free-flight rocket, was especially interesting because of it s departure from standard configurations. Rudy's another young modeler to watch.

In control-line the Smith-Stegens combination romped all over Proto-Speed, adding once again to the long list of wins they have been accumulating with this design for over a year. Tops in design (*Continued on page* 50)



Jet and rocket events provided excitement and refreshing designs galore. Jetex-power events were flown for first time at a Nats.

RADIO CONTROL NEWS

by EDWARD J. LORENZ

For most of us these are the best flying days of the year. Even the summer's uproar over frequencies has quieted down. Man!

CLUB NEWS

► On July 27, assisted by Bill Glick, Ken Willard made the first non-stop flight from the coast to Catalina. The ship was a six-foot Breezy with a K & B .15 engine and single-channel Babcock radio equipment. It took 48 minutes to reach Catalina, 1:47 to Avalon harbor. The flight was made at 300 feet altitude on 20 ounces of fuel. All-up weight was 5¾ pounds.

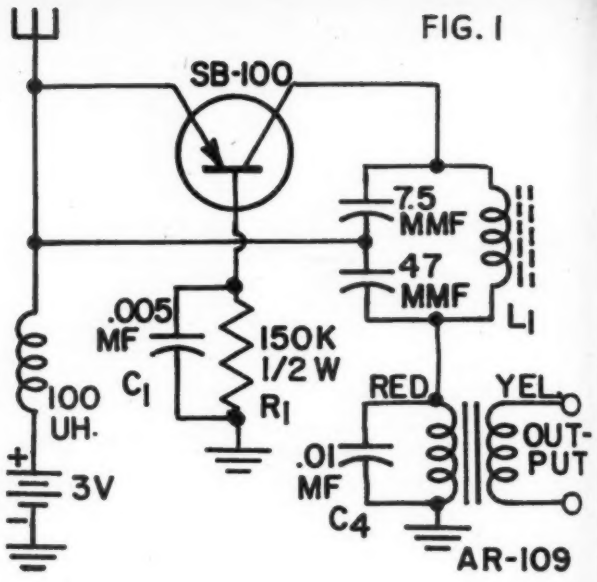
On a test flight, the big Breezy took off after a 22-second run to rack up a Larks' endurance record of 1:37. The two mile flight to the Catalina coast was made at an average of 27 mph. It is interesting to note this speed is about five mph greater than the winning pylon race time at the Nationals. The complete story will appear in a near future issue.

After six years of active radio control work, the Aerial Robots (Stan Powell, 220 Oakshire Avenue, Modesto, California) have a membership of over 25 and have come out with their first newsletter. The Transmitter will carry info on this club and other groups are invited to get in touch with them. During the July flying, Fred Atwood won a spot landing contest with his Curtiss Robin and Alex Schneider had a filament lead break on him, resulting in a fly-a-way. The Schneider cub remained in sight for 30 minutes and landed about three miles away. Take heart ye novices, it also happens to the expert.

The San Leandro Channel Masters (3334 Costa Drive, Hayward, California) are going in for RC bombing events and here's a little scoop on how it's done. The ideal bomb is said to be a Kleenex type tissue bag filled with flour. The bomb must break in order to score. Don Morgan releases bombs by running off his engine control. Sid Berwick kicks them out when in full up elevator and Bob Leininger uses a spring-loaded relay which is activated by means of his magnetic wheel-brake channel. Won't be safe around an RC flying site soon. This group is also going in for speed, duration and distance flying.

We hope you don't mind the rather constant publicity we give clubs like the LARKS, but they are active and they get information on their events publicized. Bill Bowen, the Editor, (3301 Opal St., Torrance, California) advises that Dick Everett brought a pre-fab Japanese RC plane to one of their meetings. Named "Over The Rainbow," this model was pre-fabbed right down to a formed and soldered landing gear with wheels. Bob apparently was impressed with Walt Good's proportional system, during a trip east. Since the west coast boys don't use too much in the way of pulse systems, Bob was amazed at the continual movement of the control surfaces, a characteristic of the system which does not affect the plane in straight flight. After this year's NATS we think the west coast will be building Walt's set and looking into pulse systems in general.

FIG. 1



C_1 C_4 R_1 WILL CHANGE QUENCH FQCY, ALSO AFFECT TUNING.
L_1 - 20T NO.30 EN. WIRE 5/16" DIA. SLUG TUNED COIL.

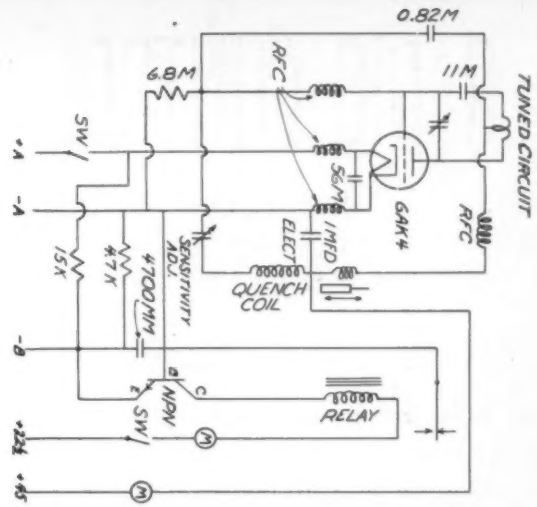
At an RC meet on May 12th (ARCS), Jack Cooley, 6570 Buckingham, Allen Park, Michigan, reports that there were three events. W. George taking first in rudder only with 69 points, C. Bennett first in multi-channel with 92 points and G. Kilbey first in RC sale with 135½ points. To give hope to the newcomer to RC flying, we'd like to point out that even the experts get beaten at times. This contest placed Maynard Hill of Pittsburgh, Kratzet of Grosse Pointe, Mich., Dick Branstner and Lou Errington, at various levels behind first place. However, this is a discussion we'll continue at a later date, since it came up several times at the NATS.

Gliders are far from being a thing of the past, especially in RC. J. T. Baker, Huntsville, Tenn., built a 7-foot, 52-ounce version of Frank Bethwaite's Mk V. Jim uses the Les Wright receiver-actuator unit, and swears by it. Incidentally, this combination is growing in popularity and the next advancement in single-channel operation, in this country, should be the development of a combination relay-actuator.

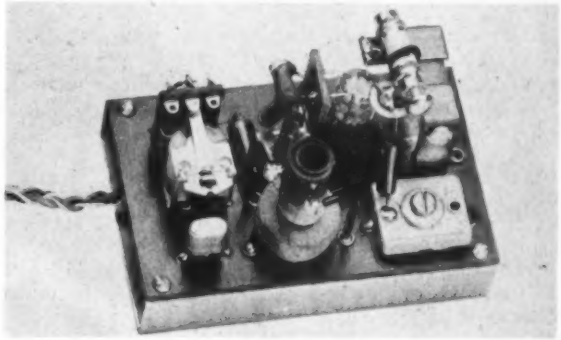
Bob Heise of the East Bay Radio Controllers, in Calif., set the first speed record under the PRCS rules, which were given in a past column. His 66" shoulder wing model, with a K&B .35 and Babcock 3-channel radio gave him an average of 50.3 mph. Downwind speed was 70 mph and 30 mph on the upwind pass. Trimmable elevators were used (a must for this work) and a Bonner compound on the rudder with a 3-speed engine control. We watched the FAI speed runs at the NATS and saw deBolt, Branstner, Kratzet, Root and a few others run the course. Dale Root took top honors with 60½ mph, as compared to the

Going or coming, the Little Breeze, latest boat kit by Babcock Radio Models, makes up into this extremely realistic looking craft.

The plastic 31½ inch long hull of the Little Breeze accommodates a variety of radio gear. Chrome-plated hardware. Man at the wheel?



Significant development by Citizenship in 465 receiver is transistorized amplification—in fact, a relaytor would be possible. More sensitive, too, it offers another "out" for victims of the traffic light snafu on 27.225. Double-decked for easy vertical mount.



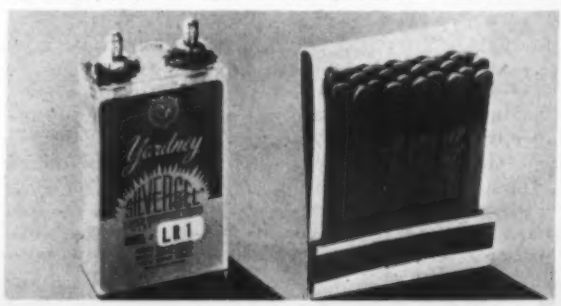
FAI record of 66 mph. This event showed the need for better timing and tracking equipment. We had a scheme drawn up for presentation next year; however, this system will be presented next month, thus giving clubs time to build it during the winter months.

At the NATS, Bill Saks, DCRC, stated that single-channel work should be based on the control surface moved and should be considered as a function. In other words, if you operated the rudder and elevator, by any means you desire, this would be considered out of the single-channel class. While on this subject, here is the British S.M.A.E. definition of single and multi-channel.

Single-channel radio control equipment is defined as that in which there is a single channel of radio communication. This may be either a single unmodulated carrier frequency or a carrier frequency modulated by one audio-frequency. Multi-channel equipment is that in which there are two or more channels of radio communication. These channels may consist of either different carrier frequencies or a single carrier frequency modulated by two or more audiofrequencies. To continue the discussion by Mr. Nicholls, given in the Aero Modeller, he makes the following statement: "Where modelers have made a mistake is that they have confused controls with channels. If a modeler chooses to obtain two or more controls on a single channel equipment by the use of a compound escapement, it does not alter the fact that the radio equipment is still single channel. In the opposite case, should a modeler choose to use two radio channels to operate a single control, the equipment is still correctly designated multi-channel." Unquote. We'd like some comments on this subject since it appears that it will affect the rules and regulations under which you fly. Of course, we currently have an event for rudder only, multi-channel and (*Continued on page* 44)

Top performer at New England Championships was Lou Andrews latest, the X-Ray, a beauty on any flying field. So far no word of a kit.

Silvercels by Yardney save money. Weighing 4/5 of an ounce, this cell yields flying time equal to 2,400 pencells, at 1/32 the cost!



Lines OK??

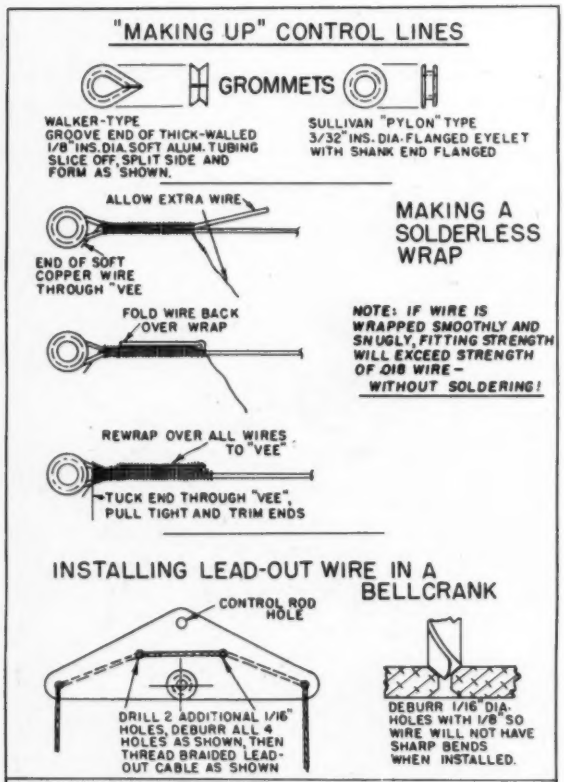
Among things they don't tell you is a suitable, safe system for making up the lines, attaching and keeping them in condition.

Properly installed, it should not be necessary to tilt handle to get neutral elevator. Note clips attaching lines to the cable in handle.

by EDWARD YULKE

► When wires break, there's a reason and nine times out of ten it's due to carelessness or lack of knowledge about how to make up and care for 'em. Modelers will spend weeks building a hot job, then grudgingly give 15 minutes of their valuable time to make up a set of lines! You're different? Maybe you too, are asking for trouble.

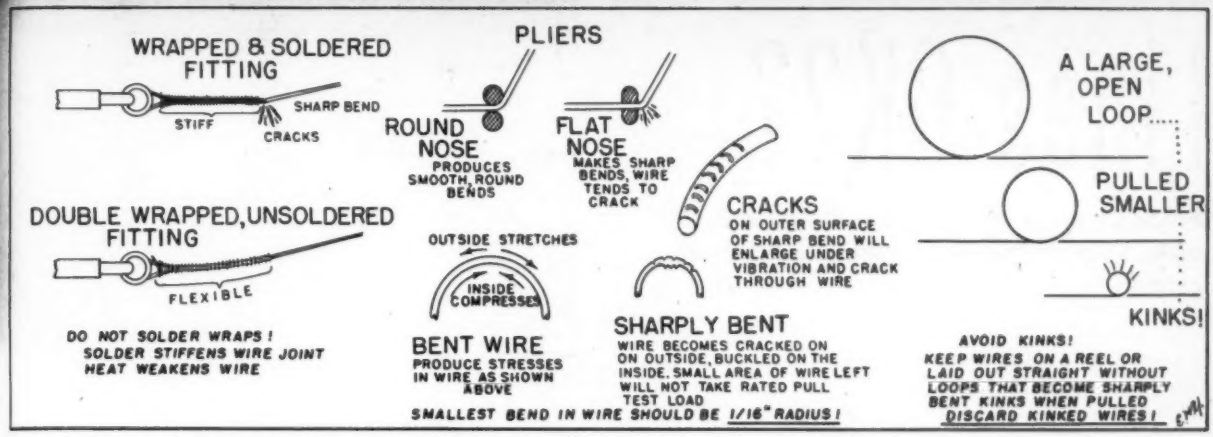
When Matty Sullivan was trying to establish minimum standards for wires back in 1948-'49 he found a lot of things that had become standard procedure with the experts, was still a mystery to the average Joe. For example, take a piece of wire, fasten it in a vise with the end sticking up and just bend that wire back and forth 'til it breaks. Know where it breaks every time? Right at the edge of the vise jaws. The wire is supported in the jaws, is free to flex outside the jaws, and most of the bending takes place at the last point of support! Take a wrapped fitting on the ends of control lines, smear it with flux and flood it with solder, and you have the same effect as the vise! The soldered joint is stiff, unable to bend. Every time the wire has some pull on it, the rest of the open wire has tension to keep it straight, so the bending occurs at the end of the solder. Eventually, the line breaks just as it did in the vise, at the end of the stiffly supported part. Matt proved without a question of doubt on hundreds of test pieces made up with a properly wrapped line, as shown in the sketches, with an eyelet or other grommet in the eye of the loop, that the wrapped fitting was stronger


"MAKING UP" CONTROL LINES
GROMMETS
WALKER-TYPE
GROOVE END OF THICK-WALLED 1/8" INS. DIA. SOFT ALUM. TUBING SLICE OFF, SPLIT SIDE AND FORM AS SHOWN.
SULLIVAN "PYLON" TYPE
3/32" INS. DIA. FLANGED EYELET WITH SHANK END FLANGED
MAKING A SOLDERLESS WRAP
ALLOW EXTRA WIRE
END OF SOFT COPPER WIRE THROUGH "VEE"
FOLD WIRE BACK OVER WRAP
REWRAP OVER ALL WIRES TO "VEE"
TUCK END THROUGH "VEE", PULL TIGHT AND TRIM ENDS
NOTE: IF WIRE IS WRAPPED SMOOTHLY AND SNUGLY, FITTING STRENGTH WILL EXCEED STRENGTH OF .018 WIRE — WITHOUT SOLDERING!
INSTALLING LEAD-OUT WIRE IN A BELLCRANK
CONTROL ROD HOLE
DRILL 2 ADDITIONAL 1/16" HOLES, DEBURR ALL 4 HOLES AS SHOWN, THEN THREAD BRAIDED LEAD-OUT CABLE AS SHOWN
DEBURR 1/16" DIA. HOLES WITH 1/8" SO WIRE WILL NOT HAVE SHARP BENDS WHEN INSTALLED.

WIRE SIZE CHART

CLASS	DISPLACEMENT	DIA. REQ. MONOLINE 2 LINES	PULL TEST	LENGTH
1/2 A SPEED	.000-.050	.010 .006	20 X	35'
A SPEED	.051-.200	.016 .010	20X	52.5'
B SPEED	.201-.300	.018 .012	20X	60'
C SPEED	.301-.650	.024 .016	20X	70'
PROTO	.201-.300	.018 .012	20X	60'
JET	ALL	.024 .016	20X	70'
ENDURANCE	.190-.350	.020 .012	60 LBS	52.5'-70'
STUNT A	.000-.200	.016 .010	15X	52.5'-70'
STUNT B	.201-.300	.018 .012	15X	52.5'-70'
STUNT C	.301-.400	.020 .014	15X	52.5'-70'
	.401-.650 B JET	.024 .016	15X	52.5'-70'
FLYING SCALE IENGINE MULTI-ENGINE	UNDER 4 LBS. GROSS WEIGHT SPEED CLASS REQUIREM'TS. MAX. .050 EA. ENG.		10X	35'
FLYING SCALE	4 LBS.-10 LBS.	.020 .016	10X	52.5'-70'
FLYING SCALE	OVER 10 LBS.	.028 .020	75 LBS	52.5'-70'
TEAM RACING	.190-.300	.018 .012	20X	MIN. 60'
COMBAT	MAX.-.350	.020 .014	20X	60'
F.A.I. CL. I SP.	.1525	.010	20X	37'-4"
F.A.I. CL. 3 SP.	.610	.016	20X	65'-4"

Top—Soldering is a menace; use solderless wrap shown. And always use grommets. Just above—a chart giving line lengths and diameters.


WRAPPED & SOLDERED FITTING
SHARP BEND
STIFF
CRACKS
PLIERS
ROUND NOSE
PRODUCES SMOOTH, ROUND BENDS
FLAT NOSE
MAKES SHARP BENDS, WIRE TENDS TO CRACK
A LARGE, OPEN LOOP.....
PULLED SMALLER
KINKS!
DOUBLE WRAPPED, UNSOLDERED FITTING
FLEXIBLE
DO NOT SOLDER WRAPS ! SOLDER STIFFENS WIRE JOINT HEAT WEAKENS WIRE
OUTSIDE STRETCHES
INSIDE COMPRESSES
BENT WIRE
PRODUCE STRESSES IN WIRE AS SHOWN ABOVE
CRACKS
ON OUTER SURFACE OF SHARP BEND WILL ENLARGE UNDER VIBRATION AND CRACK THROUGH WIRE
SHARPLY BENT
WIRE BECOMES CRACKED ON ON OUTSIDE, BUCKLED ON THE INSIDE. SMALL AREA OF WIRE LEFT WILL NOT TAKE RATED PULL TEST LOAD
AVOID KINKS!
KEEP WIRES ON A REEL OR LAID OUT STRAIGHT WITHOUT LOOPS THAT BECOME SHARPLY BENT KINKS WHEN PULLED
DISCARD KINKED WIRES!
SMALLEST BEND IN WIRE SHOULD BE 1/16" RADIUS!

Why do lines break? Well, Sherlock, just look at these telltale clues! It's evident, however, that there's no excuse for line failures.

than the line! Pull test after pull test broke the lines away from the fittings. The unsoldered wrapped fittings never opened or broke! The breakage could occur only when the rated strength of the wire was exceeded.

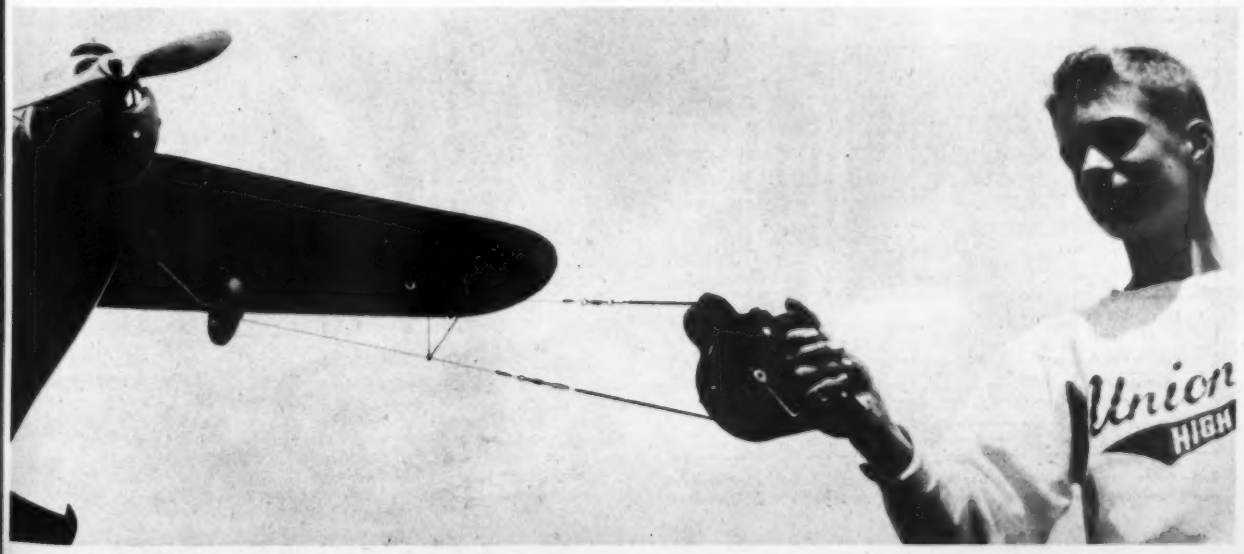
It was found, too, that the heat from the soldering iron weakened the wire by removing some of the heat treatment that gives it strength. Add to this the flux, which dissolves the protective coating on the wire, and you have a general picture of why the boys who have learned to wrap a fitting properly have fewer crack-ups. The sketches shown are similar to those the Academy of Model Aeronautics published in their rule book. The "secret," if it can be called that, is simply that the unsoldered wrap flexes with the line, preventing concentration of bending that weakens the wire.

Along with the wrapping procedure we've shown a few ways to make ferrules for inside-the-loop in the wire—just loops aren't enough. You make them round with a pair of pliers, the ship in flight puts tension on the loop and flattens it out. When the ship comes down, you open the loops to disconnect the lines and the repeated flexing weakens the wire. Using a ferrule either made from soft aluminum tubing or a flanged eyelet as shown, keeps the wire in its proper shape and prevents repeated bending over a short radius.

The closest any pair of pliers with sharp edges should come to control-line wires is (*Continued on page* 42)

So he picks up the handle and gives it up and the crate dives into the ground. Familiar? "Walk" the lines like this and play it safe.

Left—Keep lines on a reel—even if you make it yourself. Below—A Walker U-Reely (by American Junior) is a versatile piece of equipment.



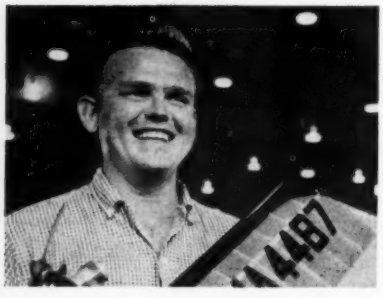
"Why do you like the Nationals?" photographer asked during the 1957 meet at Willow Grove and got these answers.

"I liked the Nats because...

David Baker, Contestant, London, England: "An Englishman's impression of his first Nationals? The U.S. Navy without whom it would be just another contest. The friendliness of the great and the near great. The quality (and quantity!) of the RC flying. I'll have plenty to tell the boys at home when I get back to England again."

George Perryman, Contestant, Georgia: "Why is it, yo'all, that at the Nats each year our models drift out of sight quicker and the fields and fences get higher and harder to climb. Rubber motors get harder to wind. Finally, why do the Yankees get tougher for us Southern boys to beat each year?"

Lt. Hal Wills, Weather Service Officer: "Good clear weather is essential for a successful Nats. With proper interpretation and manipulation of the weather chart, heavy showers occurred on several days as close as 500 yards from the field's edge, but barely a few drops of rain fell on the field proper!"



George M. Aldrich, Stunt Champ: "Because of this year's new stunt rules, everyone had to work extraordinarily hard on the pattern. It was a big thrill to see so many "Noblers" flown in stunt this year. Before Top Flite produced the kit version of this design of mine, plans appeared in MAN, of course!"

Duke Fox, Engine Manufacturer: "There definitely seemed to be more interest in speed this year and one of the reasons must be because of the fact that there is now a good choice of competition engines including the K & B 29, Dooling 29 and Fox 29R & X, for instance, plus a few handmade engines."

Tony Becker, Nats Contest Director: "A big surprise and a pleasant one—was the total entry of about 1,700, when we had planned for approximately 1,200. Running the speed events was complicated by rules disputes. We have to abide by the rules at a big meet like the Nats, otherwise, chaos would result."

Bill Effinger, Kit Manufacturer: "As a manufacturer, the 1957 Nationals gave us a chance to see a wonderful cross section of America's model builders. It demonstrated the ever increasing interest in flying scale model building. Above all, the U.S. Navy personnel at Willow Grove ought to be congratulated."

Gee Braman, Kit Manufacturer: "In Jet PAA-Load and Rocket Powered Free Flight—the latest addition to the Nats—lively interest and fine flying performances were the highlights. Models powered by this means of propulsion, have the advantage that they may be flown where space is limited."

Christine Zaic, Kit Manufacturer: "One of the most fascinating sights at the Nats is to see the modelers at the work hangar benches as they work feverishly on last minute details of repairs. I've attended International contests in this country and abroad, but the Nats is the "Greatest Show on Earth" when it comes to model planes."

Dallas B. Sherman, Pan American World Airways: "This was a grand Nats. Most pleasant feature was seeing so many old friends. Most inspiring were the many enthusiastic young beginners. Incidentally, if you want information on all PAA-Load events, send for the new Rules and Regulations booklet to Educational Director, PAA, 28-19 Bridge Plaza North, Long Island City 1, N.Y."

Dorothy Conover, Model Building Wife: "We enjoyed the facilities on the base: the food, the flying area and the hangar workshop. The lack of test flying time on the field was the biggest gripe. All the same, we had a wonderful time."

Richard Palmer, Model Shop Owner: "Attending the Nats this year, it was good to see many contestants from the East Coast who don't usually get a chance to attend when the Nats are held at locations in other parts of the country. Except for the heat and the dust, everything seemed to run very smoothly."

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FOR 4 "19" ENGINES

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FOR 2 "19" OR "29" ENGINES

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P2V-4	wing span 50" length 39"	$25.95
P2V-7	wing span 52 length 47	$27.95
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Packet #3PP—FIGHTERS: Northrup Black Widow P61; Hawker Hurricane 10; Hawker Tempest 10; Bell Kingcobra P63 9½; Douglas Dauntless SBD5 10½; Bell Airacomet P59A 12½; Messerschmidt 109G1d 8½.

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FOREIGN NOTES

A monthly world-wide round-up of technical developments, designs, significant industrial products.

P. G. F. CHINN

GREAT BRITAIN

The return of the Wakefield Cup from the FAI and the resumption of its control by Britain from 1959 as a separate international event, now seems probable. As the FAI has failed to conform to the donor's original condition requiring that the Trophy be competed for annually (by their decision to split World Championship contests into bi-annual paired events), Britain's S.M.A.E. say they have no option but to request the return of the Trophy.

WEST GERMANY

In West Germany, the annual National Championships are divided into separate meetings for free-flight, controlline and radio-control. First of these is the free-flight meet, which, this year was again held at Kassel-Waldau. There were events for A/1 and A/2 gliders, flying-wing gliders, two classes of free-flight gas, flying-wing as, two classes of rubber and a rubber-powered flying-wing event.

Weather throughout the meet was close to ideal and the general standard of flying was very high. A slight contretemps occurred the night before the contest was due to begin when, owing to a slip-up somewhere, a battalion of U.S. Army troops, complete with 140 trucks, arrived and set up camp on the flying field. We doff our caps to their commanding-officer who, after confering with German Aero Club officials, pulled out again at 03.00 hrs. leaving the field free for the contest. Clearly, things have altered since this columnist's Army days. . . .

The first events were for A/2 and A/1 gliders and for the new German N/2 class flying-wing. Some of these latter had exceptionally good performance, with a straight tow up to the top of the line and a flat wide-radius turn in the glide. The A/2's were to usual high German standards and not much altered from established Lindner and Denzin design practice. Noticeable was the fact that the strictly "still-air" type ship, with its marginal stability, lost out in the intense thermal activity half-way through the contest and tended to spin. In the smaller A/1 class, top items, this year, were close to those of the A/2's. One of the best models seen was that of Horst Eichenhauer: high aspect ratio Lindner wing, long nose and tail moments and a small stab of about 14 percent.

The second day's events covered FAI free-flight gas (divided into two classes, "I" and "J" for over and under 1 c.c.—.06 cu. in.—respectively) Class N/1 (powered flying-wings) Wakefield Class and Class J (junior rubber). The FAI gas class in Germany now appears to have taken a complete swing towards the fast climb type and appears to show some English influence in design. As an indication of the high top place times in this class are the placings of USAFE modelers John Stewart and Curly Howard who flew Ramrods. John had three maximums and two shorter flights (due to the timer cutting early) and Curly clocked four maximums out of five flights. Yet these were good enough only for 30th and 16th places, respectively. (By way of compensation, however, the same fliers took 2nd and 1st places in another German contest two weeks later.)

Pentti Ella, of Finland, second in A/2 at the Nordic countries International meet, in Sweden.

AUSTRALIA

The Australian National Championships for 1957-58 will be held at Campbelltown in Tasmania, the island off the south-east tip of the mainland. To fly competitors there from Victoria State, a DC-6 has been chartered and, if entries increase, another plane will be booked also.

The most popular events in Australia at

At German Nationals, S/Sgt. John Stewart, USAF, with a Nordic built by Hans Gruber.

Ron Hind, England, '56 stunt champ, with 6-ft. Mac 60 powered giant; flown on 110 ft. lines.

the moment seem to be combat, Class B team-racing and stunt. Class A team-racing is mainly limited to those lucky enough to possess Oliver Tigers. There is evidence of renewed interest in speed, following the appearance of Mono-line units in some hobby shops. Status quo appears to be maintained in free-flight classes, but there is a suggestion of renewed activity in RC following a somewhat stagnant period during the past two years.

SWEDEN

1957 has seen the 20th anniversary of the Swedish Nationals. Held at Jonkoping, the weather during the two-day meet was, unfortunately, bad, with rain and strong winds. The performance of the top four place winners in both Wakefield and FAI F/F gas are, therefore, all the more remarkable: all eight men returned perfect five-maximum scores! They were Ragnar Ahman, Malte Blomqvist, Rune Johansson and Einar Hakansson (Wakefield) and Per Hakansson, Borje Borgesson, Rune Alsson and Hjalmar Friis (FAI gas).

The Nordic countries International event (next year to become an official FAI contest) was held at Norrkoping, August 25 and also had poor weather. This annual contest is a sort of miniature World Champs held among themselves by the Nordic group of countries (Sweden, Norway, Denmark, Finland) and features the four recognized FAI Championship classes, namely, A/2 glider, Wakefield rubber, FAI gas and FAI (.15 cu. in.) speed. Each country is entitled to send a team of four men in each class, i.e. 16 in all, but, this year, only the host country fielded a full team. Finland sent a team of 12, but Norway and Denmark each sent only three men and it is not surprising, therefore, to find Swden and Finland filling all the first places. Seppo Takko and Pentti Ella, of Finland, took the first two places in the A/2 event flying Lindner type models, followed by a Swede in third place, while Sweden took the first two places in Wakefield (Lars Larsson and Ragnar Ahman) followed by a Finn. FAI gas went to the Swedes, Hans Friis taking first with his well-known Webra Mach-1 powered ship, and Sweden was again successful in the speed event, record holder Olle Eriksson placing top with his Mach-1 glo-powered model at 177 km./hr. (110 mph). Ivoni Valo, of Finland, was second at 171 km./hr.

SWITZERLAND

One of the highlights of the Swiss modeling year was the all-controlline meet at Geneva. Swiss, French and German-Swiss

(*Continued on page 62*)

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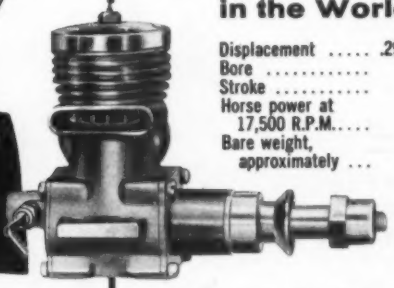

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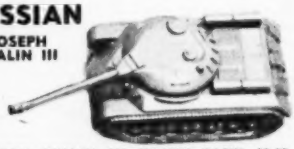

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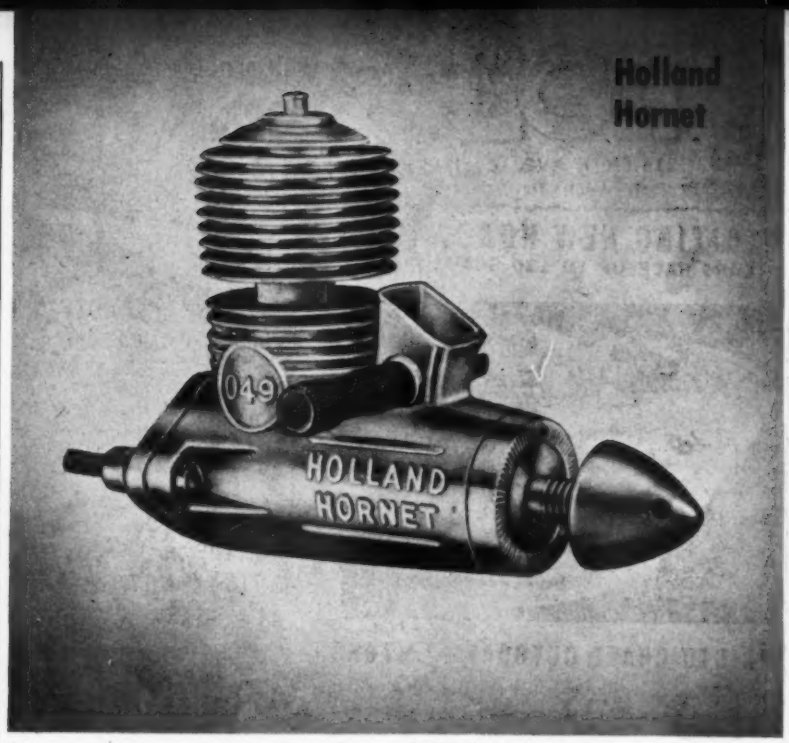

Like certain foreign engines, the Hornet has a rigid case—actually desirable charactertistic.

Bob Holland, the designer, was one of nation's leading free flighters; was mindful of needs.

Engine Review

New approach to Half A makes the Holland Hornet of special interest to a contest modeler.

by E. C. MARTIN

► The front end of an airplane was foremost in the designer's mind when he doped out this engine; it embodies nothing startlingly new but it has the dependable combination and refinement of many of the best proven small engine features, with several good practical extras for the active flier. The shape and appearance are especially suited to contest free-flight jobs.

Pylon jobs keep sprouting longer noses as .049 power-weight ratio goes up in order to get the CG somewhere near the ragged edge of stability. This adds side area ahead of the CG requiring extra compensating keel area behind it. The little bundle of machinery stuck way out on the nose also adds an inertia effect which delays the correcting action of the tail surfaces. The rather strange conclusion therefore can be drawn that in some applications model engines are not heavy enough, and Bob Holland has taken the bull by the horns and built some extra strength and weight into the Hornet where it will do the most good.

The main bearing housing is, therefore, the full crankcase diameter, apart from a slight taper, out to the prop driver, and with the help of a Kaysun prop and spinner nut makes a neat streamlined entry right back to the heavy radial mounting lugs. Out of this bullet shape sprouts an awe-inspiring rectangular intake which is far more efficient than first glance suggests, but which the instructions invite you to partially plug it if the fuel suction is inadequate. We doubt if many will find this necessary. Behind the intake rises the cylinder, nicely finned in black, with very deep exhaust ports, but plenty of meat bridging the gap to keep the lid where it belongs. The mounting bolts retain the crankcase backplate in the usual way, but instead of nuts are provided with a die cast bar having three tapped bosses with the center one equipped with a countersunk screw for retaining the bar in position behind the plywood firewall. This allows the engine to be removed without the need for access to the nuts, and obviates the alternative of soldering nuts to a piece of tin. A thoughtful extra that may well be imitated.

The alloy head includes the plug element in its hemispherical interior and screws into, instead of onto, the steel cylinder with a copper gasket seating on a shoulder at the top of the bore below the threads. The seating face on the head is turned with light ridges to embed in the copper to make a multiseal. Externally, only two alloy fins appear above the steel fins of the cylinder and with the low center terminal post the whole engine looks very compact. A clip which grounds between the two top fins, and snaps into a groove in the center post for the battery leads completes the electrical euipment.

The steel cylinder is a rugged affair developed from radial porting. The familiar scheme where the exhausts uncover first and then the bypass ports, after a little more piston travel, with the piston crown going well below the lower edge of the exhaust, is altered, but the actual movement covered by the piston in the course of opening the ports remains the same. The difference is that the exhausts are cut deeper to embrace the whole of this piston movement (*Continued on page* 53)

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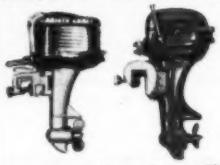

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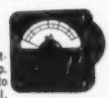

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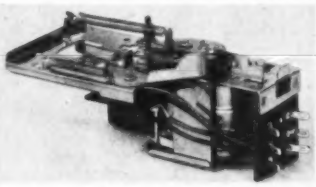

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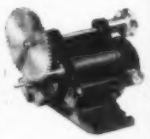

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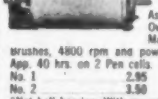

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Let's Get Started

(*Continued from page* 17)

covering job, cover the bottom first. The bottom surface is easier and you can catch the idea before tackling the top surface.

Before covering, the wood surface should be sanded smooth of all bumps, fuzz, and cement snags. Then dope the wood surface wherever the paper will touch and allow to dry. Spot dope the paper to one wing tip, then pull the paper out, and spot cement to the other tip. The dope will penetrate through paper to the wood so brush dope onto the paper at the edges as you work. Complete the tips on each side, making sure the paper is nicely pulled out. Then do the trailing edge, followed by the leading edge. As you work the edges, you can pull out the spanwise wrinkles with the finger tips by rubbing them on the paper where it attaches to the leading and trailing edges. Experts may prefer to use four separate pieces of paper on the bottom of such a wing, because they can eliminate the tiniest wrinkle. When dry, trim off extra paper with a sharp razor blade.

On the top surface, work from the center out. Spot dope the paper panel to the center rib, and to the rib at the "polyhedral" break rib, and attach the outer panel covering in the same way. Trim off the excess paper all around. Wet the paper with either a soft swab of moist cotton or with any spray gun filled with water. As the paper dries, it will pull tight. Check the wing for warps by holding it in front of you edgewise and sight it along the trailing edge. If warps begin to show, just twist the wing to the true position and hold while it dries. If warps result anyway, re-wet the offending section and twist the warped panel in the other direction slightly while the paper pulls tight. About three coats of clear dope will fill the upper pores and keep the covering tight.

When any member of our gang reached the Sniffer stage he had to learn fundamentals of adjusting a free-flight model. Outside of the unique little Dakota, we never ran into any free-flight model that would fly itself. It is asking too much of designer and manufacturer that such models fly right out of the box. Variations in the weight of wood, and of your workmanship make every model different. Like covering, there's a technique to adjusting a model.

First, is the hand glide. This establishes roughly whether the model is tail heavy or nose heavy. This test is done when it is calm or there is little wind—you learn nothing if it is windy. The ship is glided over tall grass, if possible. Grasp the fuselage slightly behind the wing and aim the nose of the model at a point on the ground about 15 to 25 feet away, depending on the size of the ship. Don't throw the plane—for it would nose up abruptly—but use more of a push than a toss. The model should glide without stall or dive, and land two-point on its wheels when trimmed properly. It should not make a pretty swoop with the nose rising just before landing on all three points—wheels and skid. This looks nice but means the model will stall under power. If the ship is tail heavy it can be balanced by adding weight to the nose, or raising the leading edge of the stabilizer (or lowering the trailing edge of the stabilizer) about 1/32 inch at a time on each successive test. Use match paper covers for shims. If the wing is movable, its position can be changed slightly by sliding it toward the rear of the cabin—maybe an ⅛ inch at a time. For sport flying, the best procedure is to leave everything as the designer intended it, and to achieve balance by adding weight. Most sport models have fixed tails and only one wing position, so weight is the best all-around method of balancing. If the ship is nose heavy, do any or all of the opposite things.

When the model is flown under power, the same symptoms may appear. Do not, repeat, do not disturb any of the adjustments you made while glide testing. We now correct tail heaviness or stalling by adding downthrust—upthrust will not be needed; if it is, the glide adjustments were out of wack. Downthrust is arranged by putting washers behind the top of the motor mount, if it is the radial type, or under the rear of the mounting lugs if it is the beam mounting type.

Adjustments are a story in themselves. Briefly, if your sport job flies straight under power, it is apt to stall and may lead you a merry chase. Cause it to turn by bending the rudder trim tab (make one if necessary) very slightly. A stall will disappear in a turn, unless the model is very poorly trimmed, or overpowered. If the model turns too tightly in the beginning, threatening a crack-up, bend the trim tab in the opposite direction. On contest stuff, this would be suicide, but here it's just fine. By offsetting the engine for side thrust (washers again), you can experiment further with adjustments. You'll make mistakes, sure, but you'll learn wonderful things. The crate may climb in circles one way, then reverse itself when the power cuts and glide in circles of the opposite direction. Use offset thrust and trim tab in various combinations, even opposite to each other.

The more bumptious "aces" in our family sometimes found the gap between simple ready-to-fly items and even the Sniffer a mighty big bite. The doctor's prescription for in-between projects is easily and cheaply filled—with sugar coated medicine, too!

Carl Goldberg Models, Top Flite, Cleveland, all have cheap, highly prefabricated all-balsa flying models for rubber power. All take some building. Though the parts are designed to fall together, always in the right position (all these fellows even stack the tabs and notches against your making mistakes), some skill is needed for neat cementing and accurate alignment in assembly. Cockeyed and warped models usually won't fly. But there's nothing tough, and you have a really hot chance of having the thing fly.

The Lil Rascal went well with our fledglings. The Ranger 21 taught them plenty about building and flying—without instruction. The new Ranger 28, with built-up construction, is a wonderful project if you've built a couple of simple jobs first. Swing this job with its fully built-up construction, cross pieces, longerons, ribs, etc., and you are set for tougher things. It's completely paper-covered. All in all, the Ranger 28 may be the ship that made you a modeler! All the fundamentals of modern built-up construction and flying are involved in this kit. It won't put itself together, as do some U-control models, but this is the only path to successful building and flying of model airplanes that have a real flying ability.

Next month we'll talk about control-line models.

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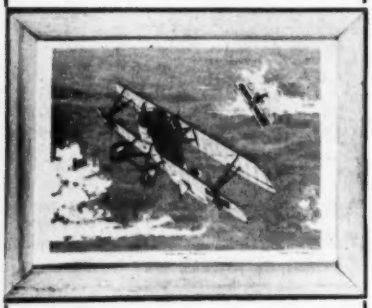
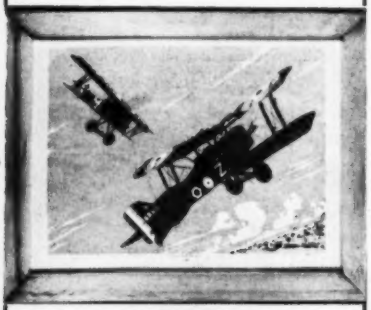
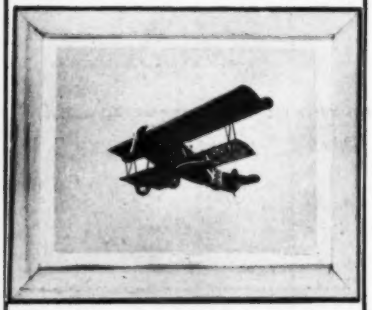


Painting No. 1—Shows **GERMAN ALBATROS** being attacked by British Sopwith Pup. All in full battle color, grey, red, brown, etc. against blue, white fleeced sky. All strut and rigging wires shown in full detail. Beautiful for your Living Room or Den. LARGE size 17" x 14" with white border ..... $3.98 ( )



Painting No. 2—Shows **BRITISH S.E. 5** of No. 85 Royal Air Force Squadron being attacked by German Fokker D-7. The S.E. 5 in olive and all Squadron markings, etc. the D-7 in full camouflage pattern colors. This is simply full of color, very outstanding. LARGE size 17" x 14" with white border ..... $3.98 ( )



Painting No. 3—Shows **GERMAN FOKKER D-7** in a brilliant scarlet against a light blue and white sky. All markings, rigging, etc. as it shown flying, looking for prey. One of the most famous of WW 1 Aircraft and was featured in old photoplay "Hells Angels" LARGE size 17" x 14" with white border ..... $3.98 ( )

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Lines OK?

(*Continued from page* 31)

a country mile! Refer to the drawings. See how nice and sharp the square-nosed pliers will bend wire? Now look at the enlarged view of the wire to see how the outside surface of the wire is stretched beyond its limit and tiny cracks open up to allow the wire to bend that sharp! You may start with .014 inch diameter wire, as recommended for your model, but with sharp bends like the one shown, you'll be flying on lines that at one point (where that sharp bend is) are only half that thickness! Those tiny cracks can easily become half the diameter of the wire in bending, and engine vibration in flight will break the lines through the rest of the way in short order. Now look below that and see the nice smooth bend made by round-nosed pliers. No control-line wire, whatever the brand or type, should be bent smaller than a ⅛" loop, the usual size for the end of a pair of tapered, round-nosed pliers.

The above, incidentally, is how kinks in control-line wire cause fractures. They begin with sloppily laid out lines. The flier picks up the handle and pulls the lines straight and what was a nice large loop in the line, pulls down to a small circle, then to a tiny circle and finally, the wire bends sharply back on itself. Now the outside of the wire is full of tiny fractures, ready to snap when you least expect it. One of the things that will make any experienced control-line man shudder is to see a modeler take a big blunt pair of pliers out of a tool box and "straighten out the kinks" in his lines! The wire is already damaged by the kink, then the nicks from the pliers make it weaker. What a way to ruin a day's flying!

When lines get kinked, it's better to save the airplane by throwing the lines away. But why get kinks in the lines? One of the pictures shows how they can be avoided. Simply start at the airplane, one line in each hand, and walk between the lines back to the handle, running the lines through your hands as you walk. Do this after you start the engine, you'll wind up at the handle knowing your lines are okay and you're ready to fly . . . safely!

Have you ever seen a modeler take a set of lines out of his back pocket, all jumbled up, carefully untangle them, and then fly? We have, but we've always stayed a good distance away! On the other extreme, we know a chap who flew for two years on lines that he carefully rolled up in ten-inch circles, then stowed away in a record album! There is a happy medium, even if you're not in the deluxe class of modeler who owns combination reels and handles.

Reels alone can be purchased for less than a buck and they're not only practical in that they save money that would be spent uselessly on tangled lines, but they keep people from stepping on your lines. Roll the lines up on a reel and people can see 'em—the reel, that is. Have you ever stopped to think that the guy you call a jerk for stepping on your lines can't see them laying on the ground any better than you can? Lay some lines on the grass, walk away for ten minutes and then come back and try to find them! Yeah, *try* it! That's where the combo handles and reels save money. You're through with a flight, you wind up your lines to the wing tip of the ship and the chances of damaged lines drop to practically nothing. Actually, you can save the cost of a reel type handle in a few months of flying and the smaller cost of a separate reel is just one extra set of lines—the ones somebody just stepped on while you turned your back to talk to Joe.

Now that we've investigated the care and feeding of the wires and fittings, let's take a look at the airplane end of things. Ever see a fellow go to a contest, real proud of his ship, proud of his carefully made lines only to have the pull test snap a lead-out line? Lead-outs have their favorite place to snap, too. Usually, it's right at the hole in the aluminum bellcrank, where somebody drilled a nice clean hole. With a sharp edge! Before you thread your stranded lead-outs into the bellcrank, take a drill about an ⅛" in diameter and remove the edge of each hole. Give the wire a chance to lay over in a curve, rather than make the sharp bend we showed you with the blunt-nosed pliers and the vise. The sketches show how to drill a bellcrank so you don't have to make up loops at that end. It's a lazier way, but much more efficient in that there's two less places to have trouble. Thread the stranded cable through one end hole, then "in and out the window" as shown, leaving sufficient wire out each end to get to the wing tip of the plane. The "in and out the window" technique will provide a positive lock that can't slip and change adjustments. If the edges of the bellcrank are rounded (holes) you've got that part of the deal made.

A lot of fellows feel that the newer plastic bellcranks aren't as good as metal. They're wrong and it's been proved over the past several years. Plastic bellcrancks not only just as rugged as the metal parts, but the nylon won't cut the wires, or bend them sharply (if the holes aren't de-edged). The fellows with the most experience on nylon bellcranks are those who fly Carrier Event ships, with electric two-speed. Radio control type models have provided the Carrier boys with escapements, throttles and relays to control them. All that's necessary is to use the insulated lines to get current from a battery in your pocket to the relay or escapement in your ship.

You can use a wood or plastic handle with a push-button on it and feed the current down the lines, but if you've got a metal bellcrank, you have a problem of insulating the lines from the bellcrank. Sure it can be done with plastic strips at the bellcrank so that the wire doesn't touch the metal, but why bother? The nylon bellcranks are a natural for engine control on the Carrier Event. Just make your lead-out lines separate instead of in one piece as we described above. Make up the assembly on the bench before installing it on your plane. The lead-out wires are installed and wrapped (without soldering) but, in the case of electrical control, leave the wrapping wires about six inches longer than required for the actual wrapping and use these wires for your electrical leads to the relay or escapement! To insulate the wrapping wires, just brush some fuel-proof dope on them after you've completed the wraps and scrape the dope off the ends when you're ready to solder them to the equipment. Leave plenty of slack when you make the hookup—a quick pull-out with the bellcrank snapping over one way or the other and the leads that are tight will break.

No, the writer is neither a funeral director nor a retailer trying to sell merchandise but, to fly control-line models, you need more than just a desire and a model built from one of the new "shake the cement in the box" kits. We've tried to show you here just what you need and how to use it for more fun and less crack-ups.

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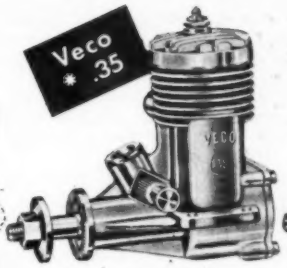

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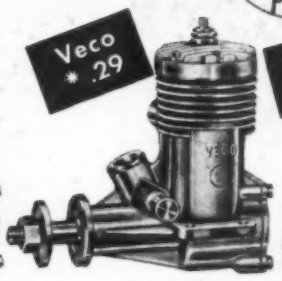

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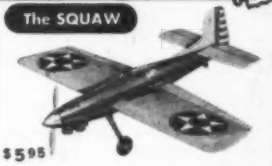

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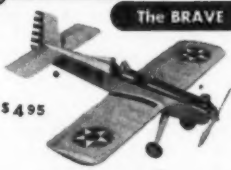

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Radio Control News

(*Continued from page 29*)

intermediate.

A bit of controversy arose in the rudder-only events at the NATS division, concerning the use of a steerable tail wheel and engine control. True, the normal tailwheel will not affect the control of the plane in the air, but it sure helps on take-off and landing points. These are items which should be made clear before a meet is held. Also, the rudder-only division, in our opinion, should remain just that—rudder only. The only possible exception is a straight engine cut-off, no intermediate engine control. This is the first event a novice generally enters, and, therefore, it should be kept fairly simple.

Also brought up several times was the questioning of the ruling requiring that your RC plane be built by yourself when entering AMA events. One doesn't build his own engine and quite frequently does not build the radio gear or actuators. Therefore, why build the plane? Why not a ruling, for RC, that the contestant build *either* the plane or the radio? The above points of interest were brought up by well-known RC fliers and might be worthy of some consideration.

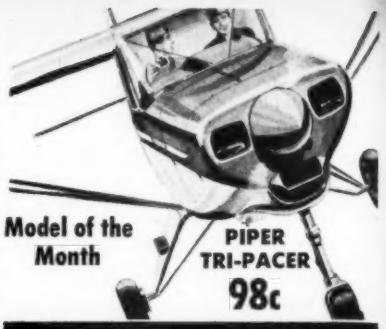
Saw some excellent scale jobs at the NATS built by H. Van Horn of North Canton, Ohio (10 foot Buhl Pup) and George Kilby of South Bend, Ind. (Waco biplane). Other scale jobs were J-3 Cubs, an SE-5, Tri-Pacers, a Sopwith and others. The most unusual RC job was Fran McElwee's Flying Saucer. Measuring 24" x 36", and approximately 3½" in thickness, this creation used a Cameron .19 and a CG RT-1 receiver (single channel, transistorized audio), plus Fran's normal hook-up of escapements. This job took off like a homesick angel and was extremely stable. After about 10 minutes of flight, at an altitude of more than 1000 feet, it was lost in the sun and had to be spun in.

GEM relays now include three-pole relays. These units are the same size as the normal single-pole units, sell for $6.55, have the armature insulated from the frame and require about 22 milliwatts of power for reliable operation. The GEM Standard requires about 10 to 12 milliwatts for reliable operation. The single- and double-pole models are also available for mounting on printed wiring boards and sell for the same price as the standard models. GEM relays are available in 50, 100, 1500, 2500, 5000, 7500 and 10,000 ohm coil resistance. Jaidinger Mfg. Co., makers of the GEM relay, also produce a SPDT push-button switch which may be panel mounted. Price is 65 cents.

CG Electronics of Albuquerque, New Mexico is now a subsidiary of Gulton Industries, Inc. and will continue to build high quality RC equipment for model use and also for industry and government purposes.

Polk's Modelcraft Hobbies, 314 Fifth Avenue, NYC announces at $4.95 a new 6v, 4 amp-hour wet cell which is about the size of the widely used NT-6. Also available for $6.95, is a charger to handle 2v and 6v cells and batteries. This very compact unit also has a 2x AC tap for bench testing glow-plugs.

Received one of the new King Beaver electric motors by Sterling Models. Suitable for use on from three to 12 volts, this $6.95 motor is 2" in diameter and 2½" long, excluding length of ⅛" shaft. Main bearings are pressed powdered bronze and the brushes are of a copper composition. Connections are made to fahnstock clips. Using 6v, the current drain on our unit was .710 amps and the speed about 5500 rpm. Provisions are made for mount-



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Four Star Plastikit

GEM Standard RC

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High sensitivity . . . new low price!
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. . . in fact minor improvements make GEM Standard even better!

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7,500 & 10,000 ohms at extra cost.
Gem MICRO DeLuxe (adjustable) $4.95

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ing another shaft which could accommodate speed-reducing gears. This motor will also operate satisfactory on 1½ volts, so that tapping down to 2v from a 6v wet cell should provide good low speed boat control.

Mr. E. M. Rhett announces the opening of MODEL-HOBBY RC Suppliers, Box 435, Charleston, S.C. This company will be a mail order house for RC fans, with service and help to the beginner being the specialty of the house. All types of RC kits, boats, planes, engines etc., will be available.

Fig. 1 shows a transistor detector circuit, as sent in by Mr. D. S. Belanger Belleville, Ill. This circuit has been tried and tested and appears to offer promise for a completely transistorized receiver. This circuit is given, not as a construction article but to show what we believe will be the trend. Before long we'll be having a complete receiver operating off of three to six volts. The SB-100 might be replaced with an AO-1 transistor, an inexpensive unit that requires selection in the particular circuit. The SB-100 is factory selected to meet certain specs, and, therefore, sells for $7.00 instead of about $2.50 for the AO-1. Ace Radio Control can furnish both types. The transformers are available from Lafayette Radio. Do not solder the leads of the transistors; use flea clips or sub-miniature tube sockets.

One of the most unusual reed transmitters we've seen has been designed by Mr. Jan Hajic of Czechoslovakia. This unit uses a 6J6 oscillator which is modulated by a 6AQ5, which in turn is fed by a 3A4 and a 1T4 audio section. The audio frequency determining circuit is unusual in that it is electro-mechanical and is claimed to be stable within 1%. This is accomplished by placing a vibrating buzzer between a small microphone and telephone (receiver). The reed is tuned by spots of solder until the desired frequency is obtained. The receiver system is unique in that it uses the reeds to operate electro-pneumatic valves which control the flow of CO_2 to small one inch diameter actuators. Weight of these actuators is less than one ounce. Gas is generated by storing dry ice in a sealed dural tank. The tank is protected by a safety valve set for 15psi. Two ounces of dry ice will last for 40 minutes and is piped to the actuators by polyethylene tubing.

Mr. S. Babcock, of Babcock Radio Engineering gives his views of the proposed licensing debate. A few high-points: transmitters should be crystal controlled to a tolerance of .01% and the plate input power to the final stage be limited to two watts or less. Modulation is not to exceed 100% or have a modulation frequency of more than 3000 cps. The antenna shall not exceed the radiation capabilities of a ¼ wave vertical. We think these are reasonable requirements and again would like to point out that a large amount of power is not needed when flying a plane or running a boat within normal limts, which is generally limited to a ¼ mile radius. It is the opinion of Mr. Babcock and Mr. McNabb, that the use of 465mc would be seriously affected by the new rulings of crystal-controlled transmitters. While we have worked with crystal controlled units at this frequency and found them to work very well, it would be impractical for a manufacturer to design and build a suitable unit for model work which would be sold at a price the modeler could afford.

NEXT MONTH
MULTI-CHANNEL
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California, Carmichael
HOBBY CORRAL
Marconi at Fair Oaks

California, Hollywood
BING'S GENERAL HOBBIES
7621 Sunset at Stanley

California, Lynwood
DUNHAM'S
10417 Long Beach Blvd.

California, Oakland
ROOT'S HOBBY HUT
6036 Telegraph

California, Riverside
DICK'S HOBBY & LEATHER
6574 Magnolia-Hillmer's

California, San Jose
ED'S HOBBY SHOP
1314 Lincoln Avenue

California, San Leandro
STEVE'S HOBBY CORNER
596 E. 14th Street

California, Santa Monica
EVETT'S MODEL SHOP
1636 Ocean Park Blvd.

Colorado, Denver
DOWNTOWN TOYS & HOBBIES
1517 Champa Street

Colorado, Denver
TOM THUMB HOBBY CENTER
7020 East Colfax

Conn., New Britain
GENE'S HOBBYLAND
11 Franklin Square

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Maryland, Baltimore
LLOYD'S HOBBY HDQTRS.
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Mass., Cambridge
CROSBY'S HOBBY CENTRE
1704-A Mass. Avenue

Michigan, Detroit
JOE'S HOBBY CENTER
9830 Wyoming Avenue

Minnesota, Minneapolis
ROCKET RADIO & HOBBY
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COLLINGSWOOD HOBBY SHOP
648 Haddon Avenue

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HOBBY HEADQUARTERS
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FRONTIER HOBBIES
Central Park Center

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TRIPLE CITIES RC
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Ohio, Akron
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16 South Main Street

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RED'S HOBBYCRAFT
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Oregon, Portland
FLEGEL HOBBY SERVICE
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TODD'S
7036 W. Garrett Rd.

R. I., Central Falls
CENTRAL HOBBIES
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S. C., Charleston
MODELHOBBY
P. O. Box 435

Tenn., Fountain City
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Would you like up to the minute R/C Data Service information brought to you regularly? Write to Grid Leaks, c/o Ace Radio Control, for complete information of the publication of hard to get R/C data, new circuits, R/C installations, etc. GRID LEAKS--(R/C Data Service) is a must for every serious R/C fan. Write for complete details.

★1958 TRANSMITTER KITS

The 1958 Mac II and Lorenz MOPA Transmitters have been completely redesigned. Now include photo pictorial and step by step instructions. Metal sub-chassis is used for rigidity and ease of assembly. Now offered with punched screened blue hammertone metal cabinets. May be had with plain cabinet too for individual designs. Also offered with MC 20 Power Supply kit.

★MAC II

The Mac II Transmitter using 2 3D6 is one of the most powerful transmitters available to the R/C fraternity on 27¼. Easy to wire, easy to tune, easy to maintain. Housed in attractive blue hammertone case comes complete with tubes, crystal, 3 section antenna, RF chassis, punched, coils wound, all required components, plain cabinet $17.95
Punched screened cabinet $19.95
With MC Power Supply kit $29.95

★LORENZ MOPA

The Lorenz MOPA Transmitter uses a 3A4 oscillator and a 3D6 amplifier for a stable transmitter which may easily be adapted for audio at a later date because of the fact that it is an MOPA type. Kit comes complete with RF chassis, all required components, wound coils, crystal, tubes, 3 section antenna, plain cabinet $18.95
Punched screened cabinet $20.95
With MC Power Supply kit $30.95

★BB54A BATTERY

We have located a source of supply of over 500 BB54A batteries. This is indeed good news to many who have been unsuccessful in locating either the old BB54 or the improved BB54A. This is the 2S ampere hour type, comes to you dry charged, must be filled with 1.275 electrolyte. Even at this somewhat higher price it still remains an excellent buy. When this supply is gone it may be difficult to find a repeat of this once in a lifetime bargain. A new battery would cost nearly twice as much. Get yours now. $5.95

★NT6 BATTERY

The NT6 has been a popular battery but is very hard to locate. We have, however located a very limited supply of them and urge your immediate action because when this supply is gone chances are no more may be had. $3.95

★AMPEREX 6007

Here is a substitute for the 1AG4 in the detector stage of many conventional receivers. Will operate as a detector in the WAG Dual, the many CG audio receivers as well as the Babcock Reflex receiver. Features only 13 mils of filament. Superregens beautifully at 27¼ and up to 52. Will fit in any application where a subminiature tube is used. Not recommended as a relay tube. $2.25

★TUNGSOL 1AG4

Good news! TungSol has again gone into production on the 1AG4 tubes at the regular price. This makes this tube again available for the standard price $1.95

★WAG Dual Kits APPROVED BY Walt Good

For the ultimate in R/C fun the WAG Dual system is finding new converts. With the stick type control it is the nearest thing to actually flying that has been developed to date. Provides for smooth proportional control of both rudder and elevator and fail safe button provides motor control with the use of a servo. Avoids the abrupt movement of other types of control and gives a real feel to flying.

Ace has had the pleasure of working very closely with Dr. Walter A. Good in the development of the kits for his dual proportional R/C system, and has been given the exclusive kitting rights to the receiver and transmitter. Walt personally selected the type of components to be used and has approved the Ace kits as offered.

Receiver kit contains all required components approved by Dr. Good. It is not recommended for beginners or those with limited R/C experience. Kit will save $3.00 on parts if they were to be purchased individually. 27¼ or 50-54. Please specify. Combo kit includes all required components, National housing can, 3 Gem relays, 5 tubes. Complete kit only $39.95

Transmitter kit including 5% tolerance resistors and individually matched measured capacitors to insure uniform results. Either 27 or 50-54 please specify. Basic transmitter and basic pulser modulator kits, 8x10x10 punched silk screened case, 7 3V4, 1 3D6, 13 MC crystal, 112" telescoping antenna, Sigma 4F relays, new improved stick control box $67.95

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Wisconsin, Milwaukee
ACE HOBBY SHOP
4504 West Burleigh

Wisconsin, Milwaukee
AL'S HOBBY SHOP
2725 West North St.

Ace R/C West
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USES .15 to .19 ENGINES WING SPAN–56"

NOW! TWO R/C SCALE LIVE WIRE SUPERIOR KITS

WING SPAN–56" USES .15 to .19 ENGINES

"SUPER CUB"

The all new "Super Cub" is a full fledged R/C model patterned after the very latest of the tried and proven Piper Cubs such as the "Super Cub", Cub "Special" and Cub "Sprayer". Incorporated with the scale appearance are all of the famous Live Wire design features that give real R/C performance plus good looks!

Like the "Champ", the new "Super Cub" is an extremely versatile model capable of excellent performance with rudder only control, yet it will handle the most fabulous 5 channel equipment with equal ease! Complete information is given so that you can build it and fly it with any type of controls that you may desire, you choose the combination!

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- ★ Removable R/C units!
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"CHAMPION"

The "Champ" is the well known and accepted Live Wire R/C scale model of the ever popular "Aeronca Champion". With the scale appearance you get the fabulous Live Wire design features which give such fine wind penetration, extreme stability, excessive ruggedness and wonderful maneuverability, plus the ability to carry more than its own weight in R/C equipment!

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Buster!

(*Continued from page* 13)

and cement the tips in place. Cement all the ribs in place, trimming as per the wing ribs to fit the trailing edge and cement the leading edge in place. Finally, cement the two 3/32" sq. top spars in place. Finish by giving a good sanding.

The rudder is constructed by first cutting out the outline from 3/32" sheet balsa. Pin it to the plan and pin all the 3/32" sq. strips in place. The movable trim tab is spot cemented in place and the complete rudder assembly sanded.

NOSEBLOCK AND PROPELLER ASSEMBLY: Performance in the finished model depends on how well you construct this unit. Although it may look difficult at first, it actually is very simple. Decide which type of prop you want to use. The flight times of the author's plane were higher when using the folding prop. The two bladed prop runs longer, but the glide is not nearly as good as it with the folding prop. I also prefer the fast snappy climb you get with the one-bladed folder. However, the choice is still up to you.

Start by obtaining a medium weight balsa block of the proper dimensions as shown on the plan. Layout the prop blank and cut out with a jig saw or coping saw. The carving sequence is shown on the plan so follow it carefully. If you are carving a two blade prop, do not finish one blade first and then the other, but complete one step on one blade and repeat it on the other side. Rough balancing should also be done after completion of each step. After carving is completed, work the prop over with lots of sandpaper.

Cement a 3/8" x 1½" piece of 1/16" plywood on the back of the hub and install a ½" length of 3/32" outside-diameter tubing into it. Make the hinge next and attach to the prop by binding with thread and cementing well. Bind only to the center of the hub. When soldering, be careful that the solder doesn't flow all the way back to the wire. It will cause binding and could even solder the hinge into one solid unit, which means you have to start all over again. After the hinge is installed, cover the prop with tissue and apply several coats of dope, sanding after each coat for a nice finish.

The front end of the 1/16" wire shaft is bent first. The hub is notched out to take the counterbalance and a piece of 1/16" sheet is put back in after it. Bind the rest of the hub with thread and cement well. Cast a lead and solder weight on the end of the counterbalance slightly over-size and file the excess metal off until the prop balances perfectly. To balance the freewheeling prop, add more dope to the lightest blade.

The noseblock is made from seven ¼" sheet laminations. Drill a ¼" dia. hole through the finished block. The plug which fits into the fuselage is laminated from ¼" sheet and 1/16" plywood and cemented in place. The plywood is needed to anchor the wood screw stop firmly. If you are using the freewheeler, you can use just one piece of 3/16" sheet. The nose block must be a snug fit inside of the fuselage. Carve it to a rough outline and plug it into the fuselage and sand it to the final shape. By putting it into the fuselage you can make it blend into the lines of the fuselage better. The bushing is made by slipping a piece of 3/32" O.D. tubing into a ¼" O.D. tubing and inserting into the noseblock. We prefer this type of bushing rather than a single piece of 3/32" O.D. tubing because the smaller diameter tubing will tend to cut into the sides of the noseblock when subjected to any kind of punishment.

Slip the tensioner spring over the shaft along with the short (⅜") length of tubing and the ball-bearing washer and insert into the noseblock and bend the loop at the rear. Slip fuel line tubing around the loop to prevent the shaft from cutting the rubber motor. One of the secrets of a perfectly functioning tensioner is to bend the loop as close to the back of the noseblock as possible. If you don't, you will have to back the wood screw out too far to engage the stop on the shaft. The wood screw will work loose in short order and come out. The Folder Assembly sketch on the plan shows about ¼" space between the back of the noseblock and the stop on the shaft when the tensioner is at rest. The freewheeler assembly is sketched on the plan and you should have no trouble with it.

COVERING: If you can obtain Jap Tis-

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62 5/16-in. WINGSPAN
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sue, use it. If not, light weight Silkspan or Skysail will work well and will be more durable at the cost of a slight increase in weight. Before covering, give the entire airframe a good sanding and check all the joints. An extra coat of cement is well worth the time involved. Put a coat of clear dope on every part of the airframe that will have the covering attached to it, on the fuselage, longerons, the wing and tail, the leading and trailing edges, and the ribs at the dihedral breaks. Sand the fuzz off with fine sandpaper and proceed to cover. This preparation is very necessary as it helps the tissue adhere better.

The fuselage is covered with four pieces of tissue, one for each side. The grain should run the length of the fuselage. Put clear dope all around the edges of one side and lay the tissue on it. Attach one end at the front and pull the other end to the rear and attach it. Do not pull tight, but just enough to pull out any wrinkles. Go back to the front and pull the tissue out and attach to the sides, working toward the rear. Again use just enough tension to smooth out the wrinkles. All four sides are done in this manner. When finished, spray with water and let dry. The tissue now will be stretched tightly and you can brush on three to five coats of clear dope cut 50-50 with thinner.

The wing is covered top and bottom. Each section of the wing is covered with two pieces of tissue, one for the top and the other for the bottom. The wing and tail are covered in the same manner as the fuselage. That is, just dope around the edges and when attaching paper just pull it tight enough to smooth out the wrinkles. If the tissue doesn't want to smooth out at the tips, cover them with separate strips between each rib. The wing and tail are also given three to five coats of thin, clear dope. Avoid using colored dopes as they really add to the weight. If you want to trim it fancy, use colored tissue instead.

FINAL ASSEMBLY: The rudder is now cemented into the stabilizer. Also cut the rudder tab away (you remember it was spot cemented in place during construction) and install the soft aluminum hinges. The tail assembly may be cemented directly to the fuselage if you so desire, but for ease of transportation, it is best to have it removable. In this case you must cement two 3/32" sq. strips to the bottom of the stab to key it to the fuselage. This will prevent shifting and allow it to be put on correctly every time. Check the surfaces for warps and be sure they are free of them except for the one in the

STATEMENT OF THE OWNERSHIP, MANAGEMENT, AND CIRCULATION REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946.

(Title 39, United States Code, Section 233)

OF MODEL AIRPLANE NEWS published monthly at Columbia, Mo., for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Jay P. Cleveland, 551 5th Avenue, New York, N. Y.; Editor, William Winter, 551 5th Avenue, New York, N. Y.; Managing editor, none; Business manager, none.

2. The owner is: Air Age, Inc., 551 5th Avenue, New York, N. Y.; Jay P. Cleveland, 551 5th Avenue, New York, N. Y.; Yvonne P. Johnson, 551 5th Avenue, New York, N. Y.; Grace E. DeFrancesco, 551 5th Avenue, New York, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or ther securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

JAY P. CLEVELAND, Publisher

Sworn to and subscribed before me this 30th day of Sept., 1957.

NATHAN GREENBERG, Notary Public

(SEAL) (My commission expires March 30, 1958)

IMPORTANT NEWS—FROM RADIO CONTROL CENTER—U.S.A.

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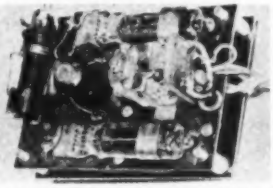
For Reliable Performance, Stability of Operation, Low Cost, Long Life

"FABULOUS PERFORMANCE" the concensus of opinion of hundreds of modelers everywhere who are presently using this super reliable receiver. Dozens of features if listed would fill this entire ad. Suffice to say if you want the ultimate in reliability in single channel receivers, then get your **ESSCO TNT.**



STD AA Model uses sub-min tubes, **MICRO GEM** relay. For 30 or 45 volt operation.
Plastic cased ..... **21.95** Aluminum **22.95**

The **ESSCO-LORENZ** as always a reliable performer. With new 1958 RK61 or XFG-1 1st stage. Supplied in several models:
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Both models equipped with plastic or alum. case as specified. **MICRO GEM** relay std. Others available.

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Sub-min ½ **TONE.** An excellent performer. Simple 2 tube non-selective audio tone receiver for use with most tone **XMTRS.** Complete set housed in alum. case ready for use. **19.95**

ESSCO MINI PULSER. The use of 2 low drain sub-min tubes in popular multi-vibrator circuit allows long battery life for economical operation. Only 40 ma filament & 1 ma B bat. drain. Complete unit housed in handsome black wrinkle case with super sensitive **SIGMA 5F** relay, A-B pots, only **21.95**

LOOKING FOR RELIABILITY IN TRANSMITTERS? HIPOWER MAC II hand held 5 watt XMTR in handsome new metal case. Complete ready for use **21.95**
Equipped with the new **ESSCO MINI-PULSER 41.95**
Available with built-in 2 volt supply & cell **34.95**
During the past 5 years the **ESSCO** Super HiPower **MAC II XMTR** has been considered the industry's very best value in powered XMTRs. Modelers write to tell us that the performance of their **ESSCO XMTR** is the same as when purchased years ago. Model XM03-57 has dozens of features not available elsewhere at the economy price of..... **49.95**

COMPACT HIPOWER wired-tested 5 watt **RF** assembly for use to modernize or to build up your own preferred layout. Size only 2¼x4. Includes guaranteed 27¼ mc crystal, 1st grade tubes & keyer jack. Models available include the ever popular MAC II at **14.95**

LORENZ 5 watt **MOPA,** industry's most reliable **17.95**

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SUPER SENSITIVE FSM for checking **XMTR** operation. Rugged 500 microamp meter used, Fone jack for tone transmitter checking, with 2 ft antenna **8.95**

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MULTI PURPOSE ADAPTOR BOX for above or other 0-1 ma meters. Ranges available; 0-1-3-5-50 100 ma and 0-3-6-60-300 volts. Includes sensitive FSM **6.95**
FSM ADAPTOR for use with your meter, complete 7.95

GOING BROKE buying batteries for your dry battery powered XMTRs? The special **ESSCO B BAT PACK** with electronic voltage regulation gives you low cost operation, better XMTR performance. **14.95**
Special model for **BRAMCO** 5-8 channel XMTR **15.95**
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wing as shown on the front view on the plan.

The motor is made up of eight strands of ¼" T-56 24" long. I've tried many different motors and find this to work best along with an equivalent motor of six strands of ¼" Pirelli. Wash the motor in lukewarm water and when dry, lubricate it with a mixture of glycerin and tincture of green soap. This is easily obtained at any drug store. Prewind the motor by starting at 200 turns and work up to 600 turns, 100 turns at a time allowing about 45 minutes rest in between. This motor will take more than 600 turns, but it will deteriorate rapidly so use 600 turns as your maximum and one motor will last several months. Insert the motor into the fuselage and secure at the rear with the 3/16" dia. dowel. Adjust the wood screw to stop the prop with approximately 50 turns left in the motor. If you are using the freewheeler use a shorter motor with about 1" of slack or tension the 24" long one. This is accomplished by splitting the motor into two sections and winding each one about 100–150 turns backward. Then allow to unwind at the rear and let the motor entwine about itself.

Balance the plane at the point shown on the plan, which is 1" forward of the trailing edge, by adding weight to the nose or tail. The weight of the wheels can be used to advantage, heavier wheels to be used if the plane is tail heavy.

FLYING: Wait for a nice day before attempting any flights. As the weather is usually poor when you finish a plane (it almost always is for me) you have time to check the plane for warps and balance again. I repeat, check for warps and balance and correct if necessary.

Test glide the plane by aiming it for a point about 50 feet ahead of you on the ground and giving the plane a slight shove toward this point. Do not point it up because it will stall even though the trim may be perfect. If the plane stalls, shim up the trailing edge of the wing 1/32" at a time until a smooth, flat glide is obtained. If the plane dives, shim up the leading edge of the wing 1/32" at a time until a good glide is obtained. At the same time bend the rudder tab over to the right to get right hand glide circle. A 75-100 ft. dia. circle is adequate. After you are satisfied with the glide, wind about 75 turns into the motor and launch into the wind. Again, do not push, but give the same slight shove as you did when hand gliding. The plane should climb about 20-30 ft. and then glide gently back down after the prop folds. Watch the glide as you can make final adjustments on it at this time.

As you increase the number of winds on succeeding flights, you may notice the plane turning sharply or climbing too steeply. Correct this by using thrust adjustments. To correct a stall, use downthrust by placing a sliver of wood in back of the noseblock at the top to angle it down. If 1/16" downthrust fails to kill the stall, remove it and start by using a right thrust adjustment. My plane needed only 1/32" right thrust. Each plane varies slightly, so adjust to suit the needs of your plane for a right hand power turn and right hand glide turn. Remember, use the rudder for glide turn only and thrust adjustments for power turn. As your adjustments correct the flight path of the plane, increase the number of turns and use a winder. As you approach 600 turns, the plane will leap out of your hand and go into a steep right hand spiral, which gradually opens up as the power diminishes and the plane makes its transition into the glide circle.

I hope you have as much fun flying Buster as I have. The original shown in the pictures has gone through three motors and has over a hundred flights on it with the only damage being tears in the tissue when pulling it out of trees. It is, without a doubt, my favorite plane and I hope it will be your favorite too. I would be interested in hearing from anyone who builds this plane so write to me c/o MAN.

Radio Control at the Nationals

(*Continued from page* 21)

was on Dale Root's Ascender. It was an electric brake, consisting of a coil and an iron armature that pivoted. When current is applied to the coil, it pulls the armature in, rubbing the other end against the wheel, like a brake shoe. Dale had hurriedly rigged this onto his Ascender as a unit, below the existing nose wheel before coming to the Nats. Though only a "fix" on Dale's ship, the idea of simple electric brakes opens up an entirely new field in "race-car" points. Picture the idea of a ship with individual wheel brakes, operated off switches on extreme right and left rudder, with a dual switch on the up elevator position of the elevator servo. If a dual switch on the elevator servo isn't to your liking for bringing the ship to a straight stop, a third electric brake on the nose wheel would bring the ship to a shuddering halt on a dime. Just don't try hooking the brakes to low throttle as one fellow did—he landed with engine chomping over slowly, brakes on, and the ship did the neatest flip of the meet. Unfortunately, it broke the back of the airplane.

Perhaps the most widely discussed subject was control surfaces. How big, how much travel, balanced or unbalanced and how to move 'em. Point of widest interest was ailerons, since they're the newest addition to the family. Among much discussion of sizes, shapes, angular travel and the like, the most important point was made by, Frank Hoover of C.G. Electronics. Frank related how he literally "done battle" with ailerons, trying to get smooth rolls, until he discovered that down elevator, applied from halfway to two-thirds way through a roll, produced positive, smooth rolls without hesitation. A few of the multi boys in the session admitted they were trying aileron-only rolls without much success, regardless of area and travel. We've been in touch with these same fellows since and they have found that the

(*Continued on page* 50)

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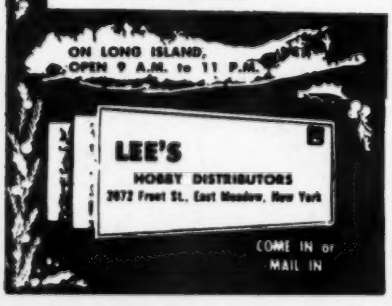

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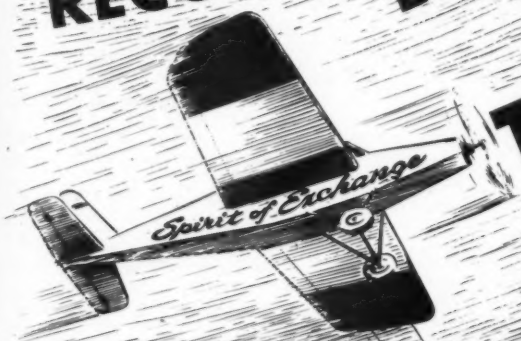

This *tremendous new record* was set on September 3, 1957 by the PROP SPINNERS MODEL AIRPLANE CLUB of Eugene, Oregon, sponsored by the Eugene Exchange Club. *Never in the history of model aviation has a record attracted so much attention or publicity.* The event was heralded over radio, TV and newspapers throughout the land. This new time, established by their plane, the Spirit of Exchange, powered by a **TORPEDO .35** using **SUPERSONIC "100"** fuel, is truly a wonderful testimonial to this "great combination"!

Careful examination in subsequent running of this **TORPEDO .35** revealed that the engine was still in good running condition and capable of many more hours . . . *and this same engine already had run 42 hours in break-in time and trial runs* — **FOR A TOTAL OF 106 HOURS** . . . certainly a great display of stamina in equipment as well as the men who flew the plane!

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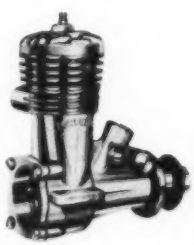

We should like, also, to congratulate the "Flying Stinkers" of Dallas, Oregon, who, under the guidance of Wally Gibbs, nine days previously had established a record of 35 hours and 8 minutes. Their plane, too, was powered with a **TORPEDO .35** using **SUPERSONIC "100"** fuel—Truly a *"great combination"!*

—The "Choice of Champions"

Left to Right Kneeling: Bob Miller, Pilot; Pat Holland, Pilot; Dick Wampach, Team Captain & Pilot; Burt Gray, Pilot and Danny Sparks, Pilot.
Left to Right Standing: Ron Fetsch, Pilot; Oba St. Clair, Tech. Advisor, Pilot; Ray Howard, Pilot; Fred Hazel, Pilot; Morris Gilbert, Crew; Chuck Nickens, Crew Chief & Club President; Bill Kuykendall, Pilot; Judy Kuykendall, Crew; Wendell Gray, Pilot and Bob Steen, Crew.
Not Pictured: Ed Hart, Pilot and Gary Jacquemin, Pilot.
Our special thanks to Paul D. Agerter of the Magazine Exchange (Eugene's Toy and Hobby Center) for supplying us with all the detailed information of the record flight.

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down elevator is the answer.

Dunham's Smog Hog had what might be called "normal" ailerons in that they "looked right" on the airplane. Hinged at the top, Bob's ailerons were about 10" long and about 2" wide. Angular travel of about 20 degrees up and down gave the ship a very smooth rolling movement. Everyone agreed from looking at Bob's airplane in the air that his size of about 1/6th the chord, a little less than 1/3rd the semi-span was just right for the 'Hog . . . Since then we watched a brand new 'Hog roll beautifully on the second flight but it had ailerons only 2/3rds the span of Bob's and the same chord!

Most of the ships we saw had equal action with all linkage rigged normally. The ships with equal aileron travel rolled just as smoothly as the ones we saw with differential action.

Walt Good, flying without ailerons, made his rolls too tight in his early flights, had to "open 'em up" to get wide, smooth rolls and full points! A ship can be designed to roll on rudder only. Though Walt Good flubbed his cuban eight in the last flight, we saw him do it earlier . . . without ailerons!

Tail surfaces came in for their part of discussion during evening bull-sessions. After the kidding about "stabilators" (entire horizontal stabilizer pivoted) died down, the consensus was that 1/3rd elevator and 2/3rds stabilizer area was about the most efficient with as much as 45 degrees movement down on the elevator and perhaps only 30 degrees up needed. There seemed to be no question that more down elevator is needed to do consecutive outside loops, than up elevator travel is needed for inside loops or pull-outs.

DeBolt's Bipe used an elevator about 20% of the horizontal tail area. Most of the rudders were between 15% and 25% of the vertical tail area. Jerry Nelson of Livermore, Calif., had what was perhaps the smallest elevators and rudder noticed on the multi ships, down around 15% of the total area in each case. Oddly enough, Dale Root still uses a stab-elevator combination that is split 50-50. DeBolt is back down to 20%.

The Bramco-deBolt control box for eight-channel equipment is shown in the drawing. Harold's development of this control makes eight-channel jobs far easier to fly. You don't have to decide which control stick should be pushed where and why when a ship is tearing up the sky. Two double-pole, double-throw toggle switches that are spring loaded to center themselves off, a double-pole, double-throw push-button switch to throw control over from rudder to ailerons (elevator is simultaneous with either) and a couple of push-buttons for hi-low trimmable engine speed and you have a control box that makes flying these things a cinch (?).

One piece of equipment that helped immeasurably was a beautiful copper screen room, built by Ace Engineering and Machine Co., of Philadelphia. In it, a contestant could check out his equipment with no danger of interference to fellows flying. This was a complete enclosure of copper screening, assembled from panels that were bolted together with copper-plated bolts for good electrical contact. When the door was closed, a monitor receiver a few feet away couldn't pick up the slightest trace of a signal. The enclosure was built to be dismantled and shipped to the Nationals each year.

The similarity between the RC event at the Nats and the old National Air Races was apparent. Where the Races were held, planes, equipment and pilots were tested and actually "pitted" against each other. The Nats RC event is rapidly shaping up to just that. Planes, equipment and pilots are going to be battling it out for top honors, particularly with Pylon Racing and Scale coming into the picture.

Seen at the Nationals

(*Continued from page* 27)

and construction, this model, in their hands, is hard to beat.

Precision Aerobatics ran high with stock kit designs or modified versions. On the original side, Dick Brewer's model was one that had much to offer. Designed to fly at higher than average speeds for stunt, this design had all the earmarks of a winning combination. And so it went, in all events.

Thirteen

(*Continued from page* 19)

drying, cut the wing spars from ¼" hard sheet. They are tapered so that the wing will bend along its entire length and not break in the center. It is very essential that they are tapered. The two-piece trailing edge is cut from 3/32" medium sheet, the rear sides beveled with sandpaper and cemented together. While trailing edges are still tacky, pin them to the plan and slide the rib trailing edges into them. Cement the top spar in place, then the leading edge. Cut the tip from 3/16" sheet and put it in place. When this structure is dry, take it off the plans and add the remaining spar. Build the other panel in the same manner. When both halves are dry apply a liberal coating of cement to the spars, leading edges and trailing edges. Let this first coat dry, then apply a second coat and join together, add the center joiners, and you have a wing.

The stabilizer and elevator are built directly over the plans. The ribs for these assemblies are merely 1/16" sheet rectangles which are sanded to a symmetrical airfoil when the structure is dry.

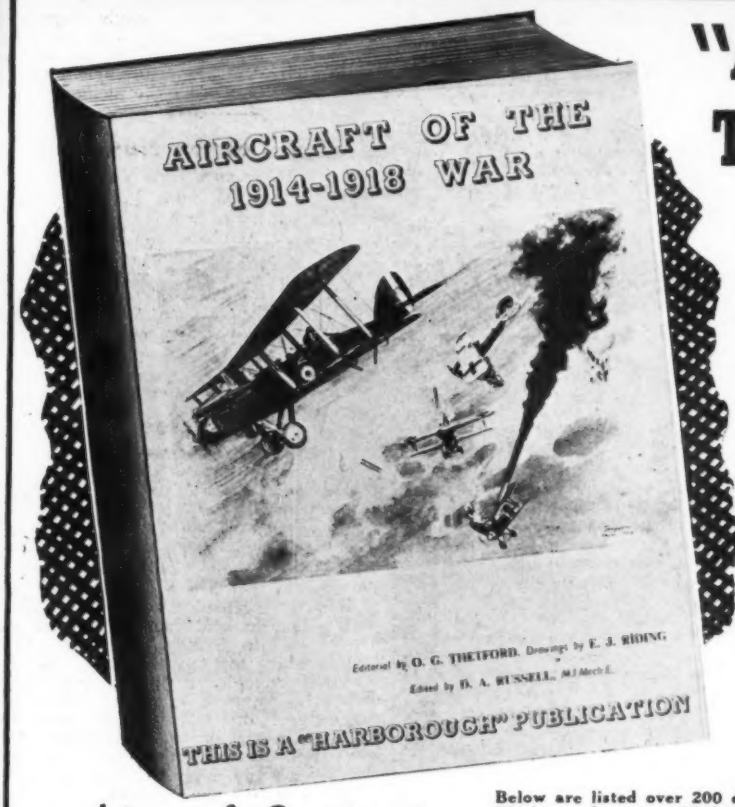
Plank the bottom of the wing center section with 1/16" sheet. Cut out the bellcrank mount; install the bellcrank with balsa pushrod attached. Wrap the wire to the wood with thread. (I use a wood pushrod because it eliminates those annoying bushings which are necessary with a wire pushrod.) Cement the bellcrank mount to the spar. Install the lead out wires and metal tubing guides at the tip. Plank the top of the wing center. Cement one ounce of lead to the outboard wing tip. Sand the center planking.

Cement the leading edge of the wing to the fuselage, pull the rear of the fuselage sides together and cement the wing fuselage joint along the entire length. Add the remaining bulkheads and cement the top block in place.

The elevator horn now is installed on the elevator. Drill two holes in the spar and cut a notch to receive the horn. Cut the fabric hinges to size and join the elevator to the stabilizer.

Build the rudder in the same manner as the stabilizer. Hook up the pushrod to the bottom hole in the elevator horn and solder a washer to the wire to retain it. Cement the stabilizer in position and put a small piece of fabric over the joint. Carve and sand the top fuselage block and add the rudder. A small amount of offset will be necessary if the model is flown in a counterclockwise direction. No offset is used when the model is flown clockwise due to the slipstream effect on the outside of the rudder.

(*Continued on page* 52)


AIRCRAFT OF THE
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Editorial by O. G. THETFORD. Drawings by E. J. RIDING
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de Havilland 4
de Havilland 5
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de Havilland 9A
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Spad S-VII
Spad S-XI
Voisin

ITALY
Ansaldo S.V.A. Scout

AMERICA
Curtiss JN-4 Jenny

APPENDIX "B"
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B.E. 8 (Bloater)
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Fairey N.9
F.E. 2D
Nieuport Nighthawk
S.E. 4
Short "275"
Short Shirl
Sopwith 2F. 1 Camel
Supermarine Baby

AMERICA
H. 12 Large America Flying-boat
H. 16 Porte Flying-boat

GERMANY
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Aviatik (1916 Type)
Junkers CL-1
Roland C-V Walfische
Roland D-VIA
Zeppelin Giant

FRANCE
Dorand AR-1
Henri Farman
Spad S-XIII

ITALY
Ansaldo "Ballila"
Caproni Bn. 3
Pomilio Scout

APPENDIX "C"
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Armstrong Whitworth F.K. 10 Quadraplane
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Avro Manchester II
Avro Spider
B.A.T. Basilisk
B.A.T. Bantam
B.E. 2A
B.E. 2C (early type 1914)
B.E. 2C(armoured type)
B.E. 3
B.E. 9 Pulpit type
B.E. 12A
Beardmore W.B. II
Bristol "F" Scout
Bristol Braemar Triplane
Boulton Paul Bobolink
Boulton Paul Bourges
de Havilland 3
F.E. 2
F.E. 3
F.E. 9
F. 3 Felixstowe Flying-boat
Fairey F. 2
Fairey Campania
Felixstowe Fury Triplane Flying-boat
Grain Kitten
Kennedy Giant
R.E. 5
S.E. 2
S.E. 5 (early type 1917)
Short Bomber
Short "320"
Sopwith Camel Ship Scout
Sopwith Camel two-seater
Sopwith Camel (with "I" struts)
Sopwith Swallow
Sopwith Bulldog
Sopwith Hippo
Sopwith Rhino
Sopwith Snark
Sopwith Bee
Sopwith Cobham
Sopwith Dragon
Sopwith Snapper
Sopwith Snail
Vickers E.S. 1 Bullet
Vickers F.B. 12
Vickers F.B. 14 two-seater
Vickers F.B. 19
Vickers Vimy
Westland N. 16
Westland Wagtail
Westland Weasel
Wight Seaplane

GERMANY
Ago C-II
Ago C-IV
Albatros C-V
Albatros C-VI
Albatros C-VII
Albatros C-X
Albatros D-IX
Albatros D-XI
Albatros Triplane
Brandenburg "Star-Strutter"
Dornier D-I
Junkers E-I "Tin Monkey"
Junkers J-IX
Fokker C-I
Pfalz Eindekker
Pfalz Triplane
Pfalz D-VIII
Phœnix Scout
Sablatnig Seaplane
Siemens D-I
Siemens D-III
Siemens D-IV
Siemens D-VI

FRANCE
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Hanriot Scout (Belgian)
Letord Night Bomber
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Nieuport 20 two-seater
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Nieuport 23 Scout
Nieuport 24 Scout
Macchi-Nieuport
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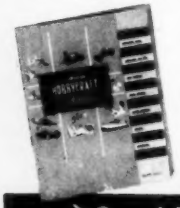

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The fuel tank is the same as the one used in "The Twelve" (November 1954, MAN). It is 1¾" x 1" x 2¾" made from tin can metal with 3/32" I.D. brass tubing vents. It should be located at this time so that the cooling duct and landing gear assembly may be installed. The landing gear is assembled by bending 3/32" steel wire to the required shape and threading it to the ¼" plywood mount. The thread then is well cemented and the assembly cemented to the fuselage.

At this time every joint should be cemented. A cement skin should be formed around the wing-fuselage joint, the stabilizer-rudder joint, and the motor mount-firewall joint. Cement scrap blocks to the inside of the cowl so that a streamlined nose may be formed with sandpaper when the blocks are dry. Put the bottom fuselage planking in place and trim to shape.

The entire model should be sandpapered smooth.

The covering is what makes a model look good, especially this type of model which cannot be covered with filler. Do not use any filler or colored dope on the flying surfaces because this would raise the wing loading to a point which would cause the model to mush and to become tail-heavy.

Coat the entire fuselage and all surfaces that will be in contact with the covering with one coat of clear butyrate dope. Sand smooth and cover the entire model with wet silk. The silk must not be stretched too tightly and the dope should be applied through the silk where it touches the frame edges to hold it in position. Trim with a sharp double-edged razor. Apply five thin coats of clear butyrate to all surfaces, sanding between each coat. The fuselage is covered with two thin coats of colored dope over the clear.

Slit a piece of black rubber tubing and cement it around the cockpit edge. Cut the windshield from celluloid and slide it into an appropriate length of aluminum tubing. Bend the aluminum to shape and cement the assembly to the fuselage.

Before attempting to fly the model, check to see if it has any warps. Warps may easily be removed by holding the warped surface over a steaming kettle and twisting in the opposite direction. Hold in this position until cold. The model should balance slightly in front of the spar.

My Fox-powered model has been flown in contests all over Calif. from 6,000 feet to sea level, and has consistently come out on top. I do not use spinners because a spinner that is slightly out of track can cause enough vibration to ruin the smooth flow of fuel to the engine.

Flying is easy as this model really flies in a groove. It may help you to fly from the elbow out, that is, keep your wrist stiff and fly with your entire arm. Move your arm in a smooth round circle and the model will do a smooth loop. This technique can be used in all maneuvers with excellent results. Smoothness is the key to winning stunt contests, so practice and keep that engine running smoothly. An engine that is running on fuel that does not have enough oil can be ruined in one run. I use a three-to-one mixture of methanol and castor oil with a small amount of nitromethane added on very cold days.

Here's a last word on glow plugs which sometimes cause trouble after they have been used with about a gallon of fuel. The element becomes pushed up into the case and causes the engine to run slightly ragged, especially when it is rich. This can easily be remedied by pulling it out slightly with a pin.

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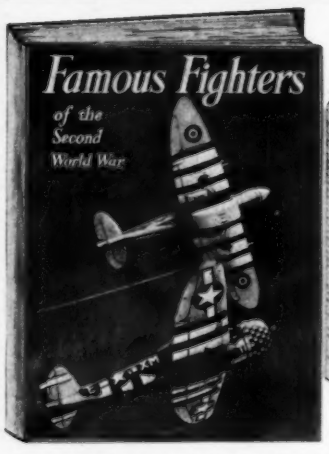

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GULL MODEL AIRPLANE CO. 10 E. OVERLEA AVE. DEPT. MW BALTIMORE 6, MARYLAND

Engine Review

(*Continued from page* 38)

and are, therefore, very large. The bypass consists of two grooves with radiussed ends milled in the cylinder wall between the exhausts which terminate just below the exhaust opening level. It is another variant of the opposed exhaust and opposed internal bypass system that is becoming increasingly popular in small engines, and in general seems to give cleaner running as well as good performance.

A steel piston, with a plain fitted skirt slightly shorter than the bore diameter, has a cup machined inside to receive the ball end of the machined duralumin conrod. The mouth of the cup is swaged over to permanently retain the rod and allows just enough waggle to accommodate the dictates of the crank. The neatness and simplicity of this arrangement makes it the best in all but one respect. You cannot replace the rod. However, a well designed rod does not wear out or break, and no trouble can be expected from this engine.

The crankshaft with 9/32" diameter and 7/32" gas passage is long and extremely well supported by the heavy bearing housing. The bearing fit is individually obtained by honing and is first class. Thrust faces are machined at both ends of the bearing with a polished steel thrust washer between the prop driver and housing. End play is the correct minimum and as a result the Hornet is qually suited to pulling or pushing, and, owing to the streamlined over-all shape, highly suitable for ducted fan applications. The rotary valve porting is exceptionally designed with rectangular openings in both components. The shaft port is no less than ¼" x 3/16", giving excellent opening and closing characteristics, and is milled and broached in such a manner that the shaft is not greatly weakened.

The needle valve assembly is neat and made from steel, with a blackened brass spraybar. A coil spring friction device holds the setting and does not twist back of its own accord. A positive shut-off is provided by stepped drillings, and the knob is proportioned so that, despite its small size, there is something reasonable to get hold of.

Operation and Handling

The Hornet can be started hot and cold quite quickly and easily by choking, the compression being unusually good when hot. A prime, however, gets it away immediately when hot on the prop supplied and a six-year-old boy, whose understanding of the operation is more professed than actual, has no trouble. With upright mounting in a fairly lively "goat" the fuel suction is perfectly satisfactory, and we doubt if any restriction of the intake would be necessary in any application with correct tank positioning. Needle control is all that could be desired, and the head element seems to be very durable for an engine of this size and consequent glow temperature. The conclusion is, therefore, that the Hornet is a thoroughly sound, reliable engine, with good performance and stamina to boot.

Test

Plug: Integral with head.
Running Time Prior to Test: 45 minutes.
Bore: .422" Stroke .350" Weight: 1¾ ozs.

Power

Prop	*RPM*	*Top Flite*	*RPM*
6 x 5	9,500	6 x 5	8,800
6 x 4	10,700	6 x 4	10,500
6 x 3	13,300	6 x 3	12,100
5¼ x 5	12,000		
5¼ x 4	13,500		
5¼ x 3	16,000		

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Pleased as punch to date with performance of ¼A Blazer. It has lived up to all my expectations . . . the reasonably thin wing gives blazing climb, flat glide . . . beautiful soaring flights . . . it's difficult to describe your feelings as you see it spiraling up there. Guess ought to — its share of contests. All die-cut balsa parts, step-by-step illustrated full-size plans. 40" span, designed for .049 engines. The Blazer is on your dealer's shelf now . . . and it's only $2.50.

HERE'S A PIC OF my new Cessna 180. I think you'll agree it's an all-balsa beauty, even if I do say so myself. 21"wingspan with fine, stable flight characteristics. This is the "champion of business-liners!" Everything's in the kit to make this simplified flying model that looks like the real job — all die-cut balsa parts, formed landing gear, 11" rubber motor, big decal sheet, die-cut windshield, 3" plastic prop, nose spinner, etc. Your dealer has it now, and the price is $1.

AND HERE'S THE SHOT of our very popular Shoestring Racer. Your response has been terrific, so I'm continuing to ship them out. With 18" wingspan and all the parts and trimmings in the kit, you seem to think it's a good flying buy at $1. And that's just what your dealer is asking for it. As a flyer, this ship is pretty close to the Ranger 21.

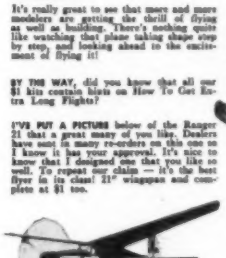
HI FELLOWS —

It's really great to see that more and more modelers are getting the thrill of flying as well as building. There's nothing quite like watching that plane take shape step by step, and looking ahead to the excitement of flying it!

INCIDENTALLY, I'VE BEEN GETTING applications from all over the country for that Model Pilot's Certificate we offer (details on the $1 kit plan too). You just beat the time specified on the plan, using one of my kits. First application came from Texas, within a few days after the kit went on sale. They do things in a big way down there! We've had some from girls, too! So far, a chap in Wilmette, Ill., holds the best time: 1 min. 20 sec. with the Ranger 21. Keep 'em flying!

BY THE WAY, did you know that all our $1 kits contain hints on How To Get Extra Long Flights?

I'VE PUT A PICTURE below of the Ranger 21 that a great many of you like. Dealers have sent in many re-orders on this one so I know it has your approval. It's nice to know that I designed one that you like so well. To repeat my claim — it's the best flyer in its class! 21" wingspan and complete at $1 too.



BY NOW SOME OF YOU may have seen the movie "Spirit of St. Louis" with James Stewart. Isn't it a thrilling film! Your dealer has my model kit — the only all-balsa rubber-powered flying model — of the plane Lindy flew. They're $1, too. 21" wingspan, all die-cut balsa parts, in fact everything needed to make a miniature duplicate of the ship that gave the world its greatest flying thrill! Best time with this model so far is by Gerald Elliott of Grosse Point, Mich. — 1 min. 13 sec. — sanded very light.

THIS IS THE RANGER 36, my new semi-duration model. It's easily capable of flights of up to a minute, and can often do much more. A larger, lighter version of the Ranger 21. It's really something new — stylish plus paper! You'll be surprised at how easy it is to build. Big 7" plastic prop, all interlocking die-cut balsa parts, two colors of tissue, formed landing gear, decals, etc., and a long powerful rubber motor to make a wonderful 28" span long-flying model. Full size plans, too, with step-by-step instructions. People raise their eyebrows when I tell them you can buy it at your dealer's for $1.

Carl Goldberg

P.S. The easiest way to get these planes, of course, is to see your dealer. If no dealer near you or he doesn't have them, send me cost of plane plus 25c each for postage and packaging. Better yet, send cost of any three and I'll pay the postage!

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Vought SBU-2

(*Continued from page 22*)

and leading edge of the elevator in one piece. Mark off the elevator separation line and cut the leading edge away from the horizontal stabilizer. Shape the leading edge and spot cement back into position making sure that there is a spot of cement between each hinge.

With a single edge razor blade carefully cut ¼" section out of the leading edge at each hinge and slot the horizontal stabilizer to fit the 3/16" ply hinges snugly. Cut six hinges from 3/16" plywood and drill a 3/32" hole. Into each hole insert a piece of 1/16" I.D. brass tubing 3/16" long. Bend one end of the 1/16" wire hinge pin and slide on three hinges. Make a brass control horn and solder it into the center of the hinge pin. Then slide the last three hinges and finally bend the remaining end of the wire.

Drill 1/16" holes into the end of the leading edge for the ends of the hinge pin. Apply cement to the hinges and fit them into their respective spots, pulling the hinge pin snugly against the elevator leading edge. Cut a small staple from shim brass and insert it into the leading edge over the pin as shown in the plans. Put a drop of solder on each staple. Then securely cement the hinge pin to the leading edge, being careful to avoid the area around the hinge.

Cut the ¾" sheet inner trailing edges, notching each end as shown in the plan, and slot the top of the leading edge for the 1/16" sheet tip. Pin your leading edge and elevator assembly to the board over the drawing and finish the assembly. The ribs can be made the same as in the rudder. Carve a balsa block to fillet the fin to the horizontal stabilizer and assemble these three parts together. Sand to a streamline surface, cover with Silkspan, and apply one coat of dope.

WINGS: Build a leading edge of ½" x ¾" balsa sandwiched between two pieces ½" x ½" balsa. Carve the leading edge to the shape shown in the rib detail.

Cut out the tops and trailing edge and pin the wing outline to the board. Install ⅜" x 1/16" lower rib surfaces in their positions, fitting them underneath the tongue of the leading edge. Cement the main and secondary spar directly on the lower rib surfaces. Make a sheet metal template of the under camber of the wing rib and mark the position of the main spar. Slice 73 camber members, marking the spar position on each. Since this is a double taper wing, both leading and trailing edge of your camber strip will have to be trimmed, using the spar as a reference point. Fit each camber strip into position, cementing to the leading edge, both spars, and the trailing edge. The camber strip must fit beside the lower surface strip at the trailing edge. Make a solid ⅜" sheet rib for the end of each panel. This can be made using the rib template. Cut out the 1/16" plywood strut plates and cement them into the wing, as shown, with those on the upper wing below the spar and those on the bottom wing above the spars.

Cut four wire fittings from shim brass and bend as shown in the drawing with a small hole in the ends for the flying wires. Hook these over the strut plates at each of the lower forward strut points and the upper aft strut points. The ends of the fittings should extend outside of the surface of the wing.

If you intend to build the flaps, add the 1/16" x ⅜" false spar, shown in the plans, and terminate the strips forming the bottom surface of the lower wing at this spar. Then cut your upper camber strips so they fit into the notches in the trailing edge and add the 1/16" gussets. The flap is made of 1/16" sheet sanded to a razor edge with 1/16" x ⅜" strips cemented to the upper sides midway between the rib positions. Fasten the flaps with a cloth hinge to the 1/16" x ⅜" spar.

Cut four ⅛" square strut fittings and notch one side to fit the 3/32" cabane struts. Then cement these into position on the inboard sides of the ⅜" balsa ribs of the center panel. Sand your wing carefully so that all ribs are even. Assemble the upper wing outer panels using the 1/16" ply strengtheners. There is just enough dihedral in the top wing to make the top surface flat. Cover the wing panels with Silkspan and give it a coat of dope. Build your ailerons and cover separately.

FUSELAGE: Begin the fuselage construction by cutting out all formers as shown on the plans. The crutch is made up of ⅛" ply cut to the shape of the heavy lines in the side view. The motor mounts are cemented directly to this crutch, being sure that you make a left and right. Formers F-1 and F-2 are cemented in position making sure that they are square with the crutch sides and that the sides are parallel. Formers F-3 through F-6 are cemented into position in order and the cockpit floor, the right half of which is shown in the top view of the crutch is added.

A ⅛" x ¾" keel is cemented into the slot in F-5 and F-6. You will notice that about 1/16" of the keel extends outside the former. Cement F-7, F-8, and F-9 to the keel and when dry, fasten the ⅛" square longeron into the top notch on each side. Mount the bellcrank on the bellcrank platform with a 1/16" pushrod long enough

(*Continued on page 56*)

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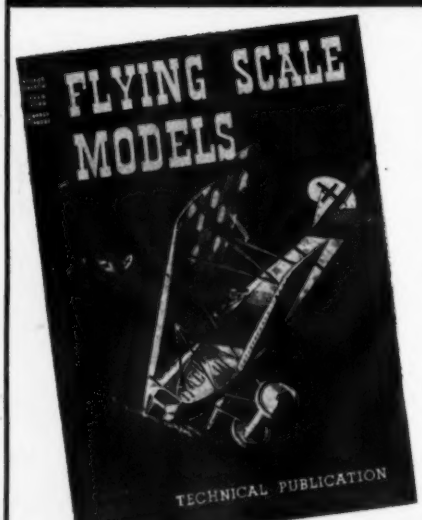

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to reach nearly to the center of the 1/16" I.D. brass tube shown in the side view. Cut and solder that tube to the end of the pushrod. Drill holes in the left side of the crutch for lead outs. Fasten lead-outs to the bellcrank and cement the bellcrank platform on the crutch. Shape the stub spar from hardwood (I used a piece of yardstick) and fix it in position on former F-4. Cut out the fillet rib and cement it to the ends of the stubs on F-3, F-4, F-4a, and F-5. The fillet rib is cut part way through at F-3 and bent so that the front part is parallel with the fuselage center line.

Make a fuel tank to fit in the space between the motor mounts and between F-1 and F-2. Fill in below the crutch between F-2 and F-3 with scrap balsa and shape to form a smooth fillet with the wing.

Bend the landing gear and fasten the main to the ¼" ply landing gear mount. Cement the mount in place between F-1 and F-2. The rear strut and spreader bar are bent in one piece with the joint at the top of the rear strut. These are bent and soldered to the main landing gear. Fasten the rear landing gear strut to a piece of ¼" square balsa with cement and thread or fine wire. Cut a slot ¼" wide and 3/16" deep in the wing fillet and cement the rear strut in place.

If you intend to put in the interior detail, most of it should be put in now before the fuselage is planked. The front seat is made of card and the rear seat is made of balsa and wire. A shoestring makes a good safety belt with fittings cut from aluminum foil. Throttle quadrant is made of ¼" balsa with round headed pins for control levers. These are cemented in place on the left after the fuselage is planked. The front instrument panel is cut from card, painted black, and cemented to F-3. The rear instrument panel is cemented to F-5A. There are two F-5A required and they are cemented in after the fuselage is planked. The stick is carved from wood and the flap handle bent from wire. There is no flap handle in the rear seat and the stick is normally stowed on the left side. The interior is painted a willow green.

The 1/16 ply tail bellcrank mounts are cut and cemented in place on each side of the keel. The bellcrank is cut from aluminum, drilled and mounted with a 2-56 machine screw. A 1/16" wire pushrod, long enough to reach from the vertical arm of the bellcrank to a short ways into the brass tube on the pushrod from the control bellcrank, is bent and installed. A short pushrod is bent to the length shown on the drawing to go between the horizontal arm and the elevator horn. The tail assembly now is installed on the fuselage and the pushrod secured to the horn. Set your control bellcrank at neutral and adjust the setting of the elevator by unsoldering the pushrod at the brass tube and lengthening or shortening as the case may be. Be sure, when you have finished your adjustment, that both halves of the pushrod are securely soldered to the tube.

Install the stringers between F-5 and F-9. Note that the stringers below the cockpit floor start at F-6.

Cut the 3/32" ply cabane strut mount and cement between F-1A and F-3, making sure it is securely cemented to F-2. Bend the cabane struts and fasten them in place with grooved pieces of ¼" square hard balsa. Make two wire fittings and fasten them at the rear cabane strut with cement and two small pins, so that the fitting ends extend about 3/16" outside of the fuselage. Cut out F-5B and install in place between F-5 and F-6. Now plank the forward portion of the fuselage with

(*Continued on page* 58)

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1/16" balsa. The area around the wing fillet is most easily planked with 1/16" x ¼" strips. Cement a ¾" x 2" balsa block on top of the ¾" square longerons and carve to shape. If you desire, this block can be hollowed as shown by the dotted lines.

The large fairing under the fuselage is cut from ¼" sheet, shaped to a streamline section, and cemented in place. It will have to be notched for the spreader bar and the notch filled with balsa. Make the landing gear and cabane strut fairings and cement them in place.

Bend a tail wheel strut from 1/16" wire and cement it to a piece of ¼" plywood cut the same shape as those portions of the rear bellcrank mount that extend below the fuselage. Drill a 1/16" hole in the keel to take the end of the strut and cement firmly in place. Fill in between the stringers with 1/16" balsa from former F-9 forward to the line shown.

Cover the entire fuselage with Silkspan and give a coat of dope. The lower wing now is installed by cementing the fillet ribs together and cementing the stub spar to the main spar of the wing. There should be ¾" dihedral in each lower wing. If you are installing the flaps, the planking in the bottom of the wing fillet must be cut out to take that portion of the flap that extends inboard from the wing.

The Vought used a plain disk wheel with a high pressure tire. The closest I could find in a ready made wheel was a 2" Veco with spokes. Fasten them on the axle with the spoke side inboard. Use a ¾" rubber tire wheel for a tail wheel and hold on the axle with a drop of solder. These ¾" wheels are generally sold in pairs but don't throw the other one away.

COWLING: To start the cowling cut four pieces of balsa 1/16" x ¾" x 3" long. Spot cement these together in pairs and pin each pair to a board 2" apart and parallel with each other. Cement the upper part of C-3 and C-4 in place across these pieces and set a piece of ¼" x ¾" balsa in the top notch. Note that C-4 is cracked at the line and bent forward. When the cement is dry, pick up the assembly, and install C-2. Now turn the cowl over and put the bottom half of C-3 and C-4 in place with a piece of ¼" balsa in the notches.

Cut two pieces of ¼" ply 1½" wide and 2" long with a notch ¾" long at C-3 and slide into the notches on the sides of the cowling for mounting platforms. Set the cowling in place on your motor mounts so that the ¼" ply platforms lie directly on top of the mounts and the lower part of C-4 fits against F-1. Mark the position of the motor mount holes on the platforms, remove the platforms, and drill the holes. Replace the platforms and cement securely to C-3 and C-4. The nuts for the motor mounting bolts should be fastened to the platforms by your favorite method of fixing a blind nut. Frankly, I just put lots of cement on them.

With a knife and sandpaper shape the ¼" balsa members in the upper and lower notches. Now the entire cowl can be planked with 1/16" balsa working each way from the pairs of 1/16" you used for a crutch. After the planking is completed sand the crutch to conform with the contour. Cut the cowl flaps at the lines and open them about 20 degrees.

C-1 can be cut roughly to shape and cemented to C-2 and shaped with the rest of the cowling. Make the scoop as shown and cement to the lower half of the cowling (do not cement to C-1 or C-2).

With a sharp knife or razor blade remove the lower cowling and cut holes to fit your engine. The nose piece shown can

(*Continued on page* 69)

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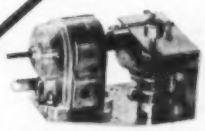

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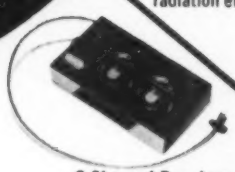

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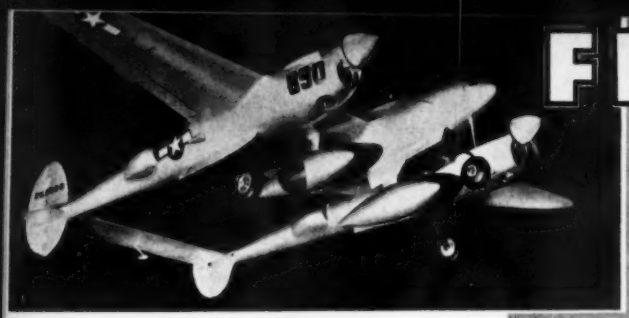

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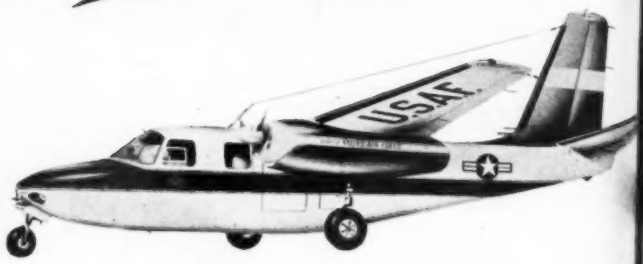

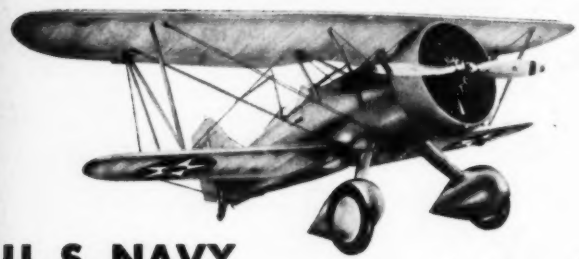

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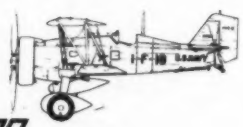

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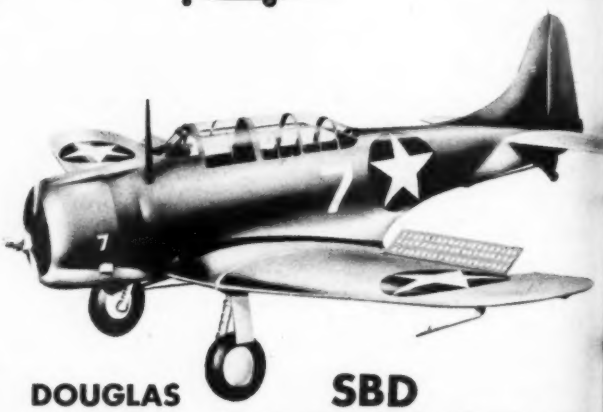

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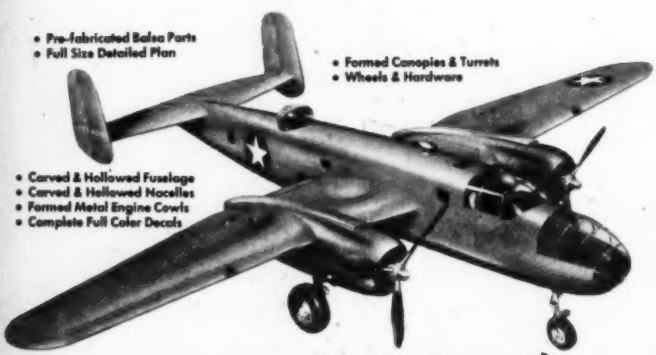

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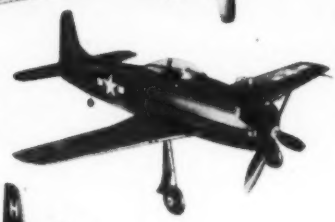
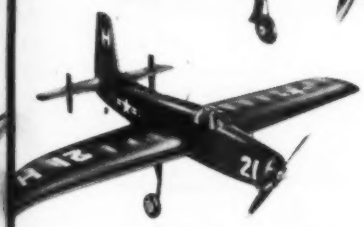

2 "F-8-F

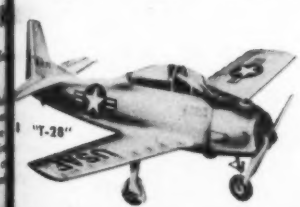

3 GRUMMAN "GUARDIAN"

4 "P-40 WARHAWK"

5 "AT-6 TEXAN"

6 "P-47 THUNDERBOLT"

7
CURTISS HAWK "P-6E"


8 "T-28"

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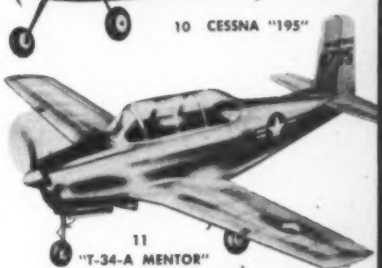
10 CESSNA "195"


11
"T-34-A MENTOR"

12 "SHOESTRING"

13
"AJ-1 SAVAGE"

14 "MINNOW"

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7 **Curtiss HAWK "P-6E"** **$4.95**
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8 **North American "T-28"** **$5.95**
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9 **"PITT'S SPECIAL"** **$5.95**
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10 **Cessna "195"** **$5.95**
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12 **"SHOESTRING"** **$5.95**
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All About Pulse Jets

(*Continued from page* 17)

of a new double-delta configuration included the building of five one-seventh scale control-line models, each powered by a special 5½ lb. static-thrust pulse-jet.

As we have said, all model pulse-jets to date have been based on the Schmidt-Argus engine inasmuch as all have been fitted with reed type flow check valves at the front. They have, however, differed in one important detail: the method of fuel injection. On the V-1 and most subsequent full-scale engines of this type, air only is drawn through the reed valves, the fuel necessary to make this into a combustible gas being sprayed direct into the cobustion chamber via injection nozzles behind the valve bank.

Designers of model pulse-jets, on the other hand, unwilling to accept the extra complication of a pressurized fuel system, have preferred to extend the front of the engine to form a venturi sectioned air intake, wherein the fuel can be picked up and atomized by the ingoing air-stream from a simple fuel jet in the same manner as a normal carbureter.

Designwise, the only other difference between the Dyna-Jet type miniature unit and typical full-scale pulse-jets is the somewhat simplified design of the valve bank or head. In full size engines, the intake bank is usually of a square, honeycomb formation and the reed valves, of which there may be upwards of 100 pairs, are mounted within this and parallel to the airstream. In contrast, the circular valve head of the Dyna-Jet is provided with a series of ten circular section passages radiating from the intake venturi and terminating in elliptical openings in the rear face of the head. These ten ports are covered by a single valve unit having ten petal-shaped leaves extending from the center. A variation of this arrangement is to be found on the M.E.W. 307 model jet. Here, the reeds, as in the Dyna-Jet, are at right-angles to the airstream, but the intake terminates in two banks of four rectangular ports.

Although the construction of a typical pulse-jet is relatively simple, with few parts, only one of which (the reed valve) is moving, the theoretical aspects of design are exceedingly complex and, as yet, only partly understood. Much work has already been done in connection with admission port and valve design and with some useful gains in performance, but investigation into combustion and tailpipe phenomena have been somewhat less conclusive.

The essential operating characteristics of the pulse-jet are in some measures related to the Kadency exhaust system, familiar to students of the full-scale two-cycle engines, in which the momentum of the exhaust gases, in a carefully designed tailpipe, is utilized to create a negative pressure at a certain point during the cycle to assist in the scavenging of burnt gasses from the cylinder.

In the pulse-jet, this principle is responsible for the automatic functioning of the reed-valves. The pulse-jet does not depend on ram air and since there is no mechanical impeller or compressor mechanism, the complete cycle of operation is dependent entirely on the fluctuating pressures within the combustion tube.

Combustion in a pulse-jet is self-supporting. Each new charge is ignited by the heat of the previous charge. Thus, once the entire cycle of operation has been set in motion, no external air pressure or separate ignition system are required to sustain it.

(*Continued on page* 69)

Foreign Notes

(*Continued from page* 35)

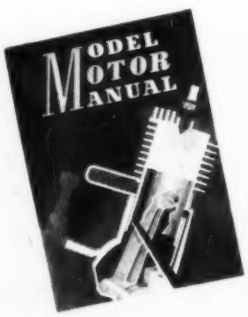
modelers competed and standards of construction and finish were high generally. Swiss contestants mostly flew American designs with American or Japanese engines as did many of the French entrants, while the German-Swiss entries were predominantly of German origin and powered with German motors. In the speed contest top times were reasonable by European standards having regard to the climatic conditions which were not ideal. Highest speed was by Georges Vallet, Geneva Club president, who clocked 141 mph using a Swiss built .60 special with rearwards facing exhaust. The team race was over 15 kilometers and was won by the Swiss. Engines used were mostly American, plus one or two O.S. Max-29's.

The stunt event was won by our Paris correspondent, J. L. de Neuflize, using a four-year-old ship (Ringmaster) powered by an early Fox 35. Much praise is lavished on the Fox by its owner: ". . . it is not as good as new, but better than new, improving each year . . . gave trouble on my second flight, starting at the third flip only, an unheard of happening which I hope will never occur again . . ." Second place went to a Palmer Smoothie powered by an O.S. Max-35 and the third man used a German Schuco-Hegi model with Webra Mach-1 motor.

IN BRIEF . . .

France . . . PAA have been doing their good work again, this time at the Morane-Saulnier airfield near Paris, where events for both American Class and International Class PAA-load models were held and attracted about 30 contestants. French

(*Continued on page* 64)



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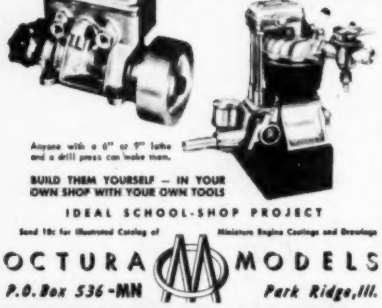

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modelers praised organization and generous PAA prizes and bigger and better support is promised for next year.

Holland . . . The annual International Flying-Wing Contest, now a recognized FAI event and embracing glider, rubber and gas powered models is being held at Terlet, Holland and is the final event in the FAI calendar for 1957. The contest, which originated as a glider event in Germany six years ago, had earlier been scheduled for inclusion in the British Nationals.

England . . . Two model fliers selected to represent Great Britain, who travelled as team members to the Criterium d'Europe C/L contest in Belgium and thereafter failed to show up for the events in which they were entered, have been debarred from S.M.A.E. and International contests for two years.

Australia . . . An Australian attack on the world controlline endurance record is expected about the time these words appear in print. The attempt is to be made by a group of members of the Elsternwick Caulfield (Victoria) Club with a Max-35 powered ship that has been especially built for the flight. Hot-dog stands and television coverage has been arranged.

M.A.N. at Work

(*Continued from page* 4)

Eons ago, at a flying session with that great modeler, Pete Andrews, Pete had the first 250 sq. in. thin-wing Half A we'd seen. It was loopy. Pete's sense of perfection was jarred when we suggested he stick in the down thrust. You have to realize, too, that tail area, tail thickness, all these things had been taken care of. No, said, Pete, you take incidence out of the wing and move the CG back. The stop watch proved his point. Many top free flight men know this. So McCombs changed the tail angle—what's the difference?

"McCombs is right," testifies Charles Francis, Hamburg, N.Y., who used the idea on a Cumulus (CG aft 75% of chord, 27% stabilizer, zero downthrust) lost on 9-second test run at the Nats, and offers a simplified deal after numerous experiments. This, we guess, is the Francis theory of relativity.

The CG is located forward of a point, Francis calls the "one-quarter chord, wing, stabilizer, distribution center." This distance (CG to ¼C wing, stab center) he divided by the overall fuselage length. It averages .06 on high wing free flights (Vary to .04 on plyons, .08 on shoulder wings). How do you find this mysterious center? The distance measured between ¼ chord point on the wing, and the same point on the stab, is called M. The distance of the sought-after center, is, so far, an unknown distance back of the ¼ chord point of the wing—he calls it Y. His formula then is: Stabilizer Area, divided by wing area, times, in brackets now, M minus Y. Application of the formula to any new job reduces the McCombs system of trial and error.

Francis checked this out on an .065 Phoenix, a Flanger HL glider, and, of course, the vanished Cumulus. Some variation will occur with other than flat-bottom wings, center of pressure travel, and parasol effect, but it's close enough. Francis' street address is: 260 Maple Ave.

• • •

► The All-Army Model Airplane program will never suffer from the travel problem, as do civilian teams each year which can't get to the Internationals. Army eliminations were held at Fort Richardson, Alaska; Camp Darby, Leghorn, Italy; Seoul, Korea; South Camp Drake, Japan; Nurn-

berg-Furth, Germany; and in Alabama, Oklahoma, California, New Jersey, and Maryland. The Army program is a good deal, don't get us wrong. But when U.S. speed models, can't be flown by proxy because Europeans are not familiar with latest techniques, we've had it . . . plan service department does so have Ramrod plans, the hottest thing since the Zipper, and free flight sensation at the Nats . . . Netzebend, Half Fast and Fierce Arrow wing designer, says don't go over 44 ounces on the Arrow. Last corner on triangular maneuvers a bit rough. . . . On September 2, Bill Millice, Hamilton, Ohio, started Saturday-morn modeling classes for kids at YMCA. "The older fellows have their own clique and don't want to be bothered with boys, who know nothing about building," says Bill. "I'm putting myself in the young man's shoes and looking at it from the other side of the fence. I learned the hard way 30 years ago and it is the best way for the boys to learn." ROG's and cabin models will soon flutter about in Hamilton. . . .

• • •

► Best way to finish a scale model, claims Jim Lancaster, Gainesville, Ga., took him ten years and ten dozen "clobberations." First, he gives it Aerogloss (choose your brand) clear; second, a mixture of Martin Senour light gray automotive primer and Aerogloss thinner, followed by a week of drying before a wet sanding. Follow with a rinse in distilled water, a 24-hour drying period, then the silver or what-have-you. This mixture will not act up through the rest of the finishing operation. If final coat silver, don't sand afterwards. Add markings and clear dope in that order. . . . Dick Paul puts the OK on the Space Tiger for 1958 FAI rules. Had 420 sq. in. wing and 125 sq. in. stab. Make stab 5¾ by 25, for 143¾ sq. in. and total is 563¾. Rules require 565 sq. in. Old model and 545 sq. in.—then and ballast to nose to reach 26 ounce minimum for '58. . . . John Smith writes in Flite-Master (club paper) about safety in speed. Breakaways due to three things: lines break, at connections or at bad spots; bellcrank pulls out; flier lets go.

Advises Smith: throw out rusty, kinked, or doubtful lines. Rub dirt off with dry rag, not oil rag because oil attracts dirt to make lines bind; wrap to AMA specs, no swivels (only slide fasteners), and keep on reel. Make occasional pull-test, use lines heavy enough for ship, with spare for that extra jerk in wind. Don't use Half A bellcrank for a B or C ship. Cut down big crank. Make mounts from ply and use a real glue, such as Elmer's white glue for this detail. No "garbage" rubbing on control system. Heavy pushrod with internal guides to stop flexing and rubbing inside fuselage. Line up so that crank is in neutral when flippers are. Use good bushing; crank will wear through a bolt. Hang onto that handle; always use a safety thong and tie it! The ball chain on market ok for small ships but use leather strap for thong on big job.

• • •

► From George Platt, Ravin Cajuns, New Orleans, dope that local combat favors Ring Masters, Sport Wings, Sweet Sweeps and the Half Fast, in that order, with K & B or Fox .35 up front. Ring Master most popular there because its maneuverability causes other, faster ships to overshoot and miss target. The Ring Sweep has cut down wing, hotter on .35, but still keeps most Ring Master maneuverability . . . want to step up maneuverability on Half Fast? Boys from Alton, Ill., use slotted or balanced flipper. These ships turn cleaner and tighter. Well, Reinhardt did that with the

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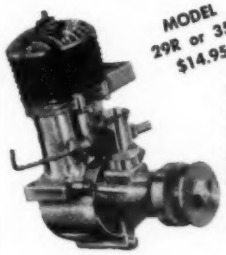

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big Stunt Wing (plan service) to win Mirror Meet. Some times the East is first. Yes? . . . Bud Rhodes, 508 Epson Rd., Baltimore, told us back in June of new trophy idea by Aero Craftsmen. Prizes from local business men dwindled over the years. Now the entrant puts up large entrance fee which buys the prizes. Entry fee $10, plus pre-registration fee of $1, and $5 late-entry fee. Wow! No limit on number of planes flown. When you fly one ship in each event and lose it on first flight, you've come a long way for nothing, so this helps. With good prizes, they allow two experienced timers per plane, one for whole flight, other for engine run. If 20 contestants, prizes worth $200. Like the Irish Sweepstakes!

• • •

► Phil Kraft, Upstart, etc., says Gimlet (RC) plan mildly goofed. Front spar ⅛ x ½, rear ⅛ x ⅜. Rib should match 5/16 leading edge, be 10% thick, not 12%. Later might be mushy, harder to trim. Incidentally, the low wing is taking over RC. Dunham and Bonner, others, flying Astro Hogs, new fuselage with Smog Hog wing and tail. Fred Dunn doed it. Better rolls, inverted. The high-wing is cooked in multi? . . . Thanks to Top Flite and Jetco for samples of impressive Nobler and Mustang Kits respectively. . . . GBH Accessories, 707 Hoyt St. SE, Grand Rapids, Mich., as you know, has excellent line of motor mounts for Half A engines. Helps the younger modelers, figures George Huntington, proprietor. George can't bring out new mounts fast enough to keep up with new engines. So he offered blanks, screws, nuts. Hardware stores just don't carry 3-48 taps and #47 drills, so GBH has gone into tools as well. (Sure, this is a plug.) His price list shows radial adaptor plate for K & B .15, for K & B .19 and .23. Matching tapped firewall plates, too. Four-hole mounting plates for Wasp, Shriek, Cadet, Hornet and any engine with 27/32 spread between the two mounting holes. Ditto plate for Baybee, Cub .049A. Blanks, spacers, screws, hex nuts, washers, filister screws, etc., and drills, taps, countersinks, tap wrenches. . . .

• • •

► From Carl Goldberg, a kit of the Ranger 28, and one for the Cessna 180. For the quarter century we've known Carl he's always been a perfectionist. Kids who want a couple of good fliers, will go for these. Plans show how to stretch-wind rubber, lubricate it with castor oil for longer life and better performance, and how to adjust the model to fly properly. The Cessna is all-balsa, not unique really, but of generous size (21 in. wing).

The Ranger 28 is built up, tissue covered, with a 28 inch wing, a genuine "stepping stone" project. Beginners can learn to build and fly with a model like this. Father-and-son teams would have fun building identical airplanes.

• • •

► And from Barney Snyder, the Modelcraft man out of Los Angeles, a one-inch scale D-7 free flight for .049's to 074's. Barney has a tow-line glider kit, too, the Ghost, an A-1 class Nordic. Barney is another old timer. Company is 25 years old. . . . Boat fans will get a kick out of American Junior's (Jim Walker, man!) Miss Thriftway, an unlimited hydroplane for Half A engines. It's scale to the winner of the Gold Cup and President's Cup. . . . Enterprise's Hawker Typhoon indicates company's new interest in serious modelers. It's a profile-type scale for .09 to .19 engines with emphasis on .15's. Paul Del-Gatto designed this—looks good to us.

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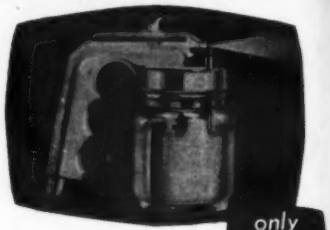

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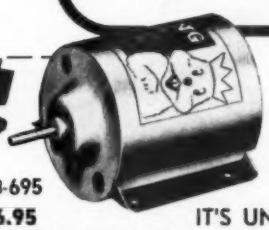

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• • •

► Chinquapins Model Airplane Club (Roger Willis, 5311 Zadell Ave., Temple City, Calif.), 25 members, including Bob Palmer. Stunt, scale, rat races, rocketry, time events. Two flying circles provided by Consolidated Aircraft, Pasadena. . . . Greater Portland (Oregon) Area Council, formed to represent Portland Fireballs, Circle Searchers, Stardusters, St. Johns Bandits, Prop Jockeys and, Vancouver (Wash.) Glo-Bugs. Promotes activities, flying, in area. (Dale McGee, c/o Gateway Cycle Shop, 11917 N.E. Halsey, Portland 20, Ore.)

• • •

► December 1 was the date set for the Ninth Annual Free Flight Contest, of Inglewood, Calif., Flitemasters (T. E. Bieber, 1216 Ardmore Ave., Manhattan Beach). The first meet had 12 scale entries, judged the day of the contest. Now, with 40 scale entries, judging is done the day before by the FAST club. During the four hours it takes for judging, the custom is that the contestants have refreshments and entertainment! In the past the Piper Supercruiser was most popular but with new club rules last year removing the endurance factor, a variety of entries, including biplanes, were forthcoming. This small scale contest gets major national publicity. An institution. . . . One of the finest free-flight meets (Hamilton Aero Club—Mike Cook, 25 E. Fountain Ave., Glendale, Ohio) in the five-state area, featured a reliability event that went over with a bang. And free flight defined by AMA rules, but no restrictions on loading or motor run. Three-flight total nearest to five minutes is the winner. If tie, man with most flights is winner. Penalty for dethermalizer: difference between high and low flight subtracted from total, if less than five minutes, added if total over five. Three official flights are scored . . . many clubs boiling over Nats management combination of B-C free flight. Speaking of issues—this one is radioactive! See us in January.

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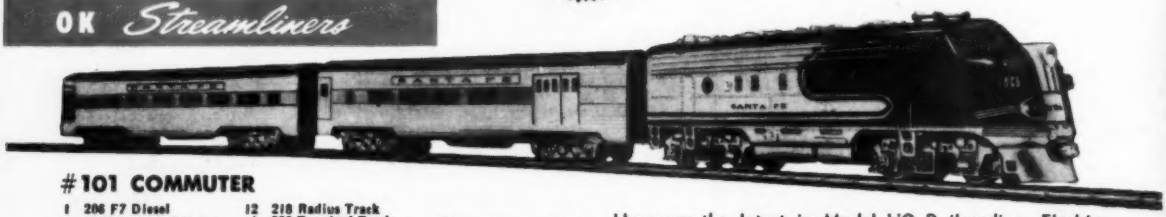

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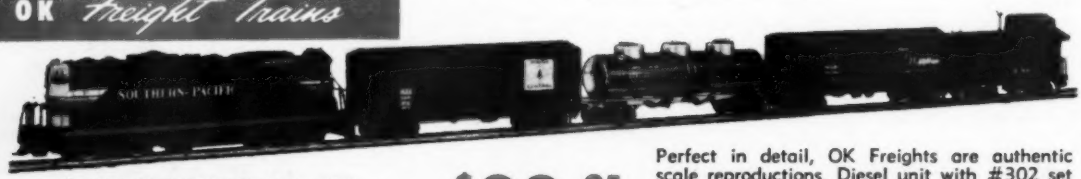

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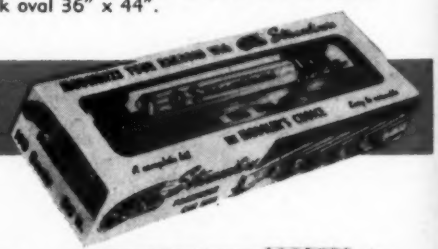

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(*Continued from page* 58)

be turned from balsa and hollowed to fit your engine and cemented directly to the end of your engine mount after your engine has been installed. Cover the entire cowling with Silkspan and dope.

FINISH: Before further assembly can be made, the finish must be put on the model. Give each sub-assembly several coats of dope, sanding lightly between each coat. A good under finish of sealer should be applied. I apply three coats of sealer and sand out the imperfections. It usually takes three such applications for a halfway decent finish. Be careful in sanding your fabric covered areas or you will find you have very neatly sliced the paper at a rib. When your under finish has reached a perfectly smooth surface, seal it with one coat of clear and sand lightly.

Give the entire airplane three coats of aluminum, sanding lightly between each coat. Mask around your planked area on the fuselage and give two coats of a very light grey (this you will have to mix yourself). The upper surface of the top wing is painted yellow.

The canopy is built now. Start from the rear section and work forward. For a good scale effect build the canopy structure from a fairly stiff shim brass with the celluloid fit inside. The front section of the hatch can be made to slide by soldering the frame to a 1/32" I.D. tube on a piece of 1/32" wire. The last portion to be built is the windshield.

FINAL ASSEMBLY: Build the wing struts and finish as indicated above. Cut a small section of the fabric from the wings to let the strut through at the strut plate. Coat securely with cement and set the top wing in position on all the struts. It would be wise to have someone standing by, because attempting this two handed can be nervewracking. Set the engine in place inverted, connect your fuel line, set the upper part of your cowling in place, and install motor mounting bolts. Hold the lower cowling to the upper cowling with dress snaps.

RIGGING: The rigging on this model is simple, consisting of a set of double flying wires and a set of double landing wires. I use small diameter stranded flying wire and swage the ends with 1/32" I.D. brass tubing. Merely slide a 3/16" long piece of tubing onto the wire, thread the end of the wire through the wire fitting and back through the tubing. Slide the tubing down close to the fitting and squeeze it tightly in at least two places with your dullest pair of dikes. Repeat the process at the other end and cut off your left over wire. Now you have a landing wire that from a few feet looks as if it is equipped with turnbuckles. On the flying wires, I swaged one end of the wire to the upper wire fitting, then threaded through the lower wing root with a needle and back up again to the other ear of the wire fitting. I would suggest a piece of celluloid above and below to keep the wire from cutting the balsa.

DECORATION: My model was decorated as the squadron leader aircraft of Squadron VS-3, on board the Lexington. A ¾" red chevron goes on the top wing with the No. 1 in black centered inside it. A red band goes around the fuselage 1" aft of the cockpit. The numbers 3-S-1 are ¾" high with the S painted white, centered in the band. The 3 and 1 are black. A black U S Navy goes under the tail in ¾" letters. There is a 1¼" red band around the leading edge of the cowling. The entire tail is painted yellow. A 2¾" star and dot insignia goes on the top of each upper wing and the bottom of each lower wing.

An antenna post, 1" tall, sets through the leading edge of the top wing 3" in from the tip. I would suggest the tooth from a large comb. A small mast goes on the top of the rudder and one on the right side of the fuselage just ahead of the red band. The antenna is made by fastening the ends of a piece of black thread, 40" long, to the masts on the top wing. In the center of that, tie a 12" piece of black thread with a simple overhanded knot in the middle and pull one end back to the mast on the rudder and cement. The other end drops down to the mast on the fuselage.

The wing walks are made from ⅛" wide strips of wet or dry sandpaper and cemented to the wing surface along the joint with the fillet. Make a line guide from wire and fasten to the left hand strut. Put loops in the leadouts, connect up the lines, crank up the engine and you are ready to fly.

FLYING: The first flight should be made from a fairly smooth surface, on a calm day, with the flying wires set as close together as you can get them on your handle. A biplane can be pretty tricky if your incidence angles are off. Try to fly as much as possible from a smooth surface because a simple turnover can certainly erase a lot of scale detail.

All About Pulse Jets

(*Continued from page* 62)

To start the pulse-jet the essential requirement is a source of air pressure. This is either blasted direct into the intake (as in the case of the M.E.W. and certain full-scale units) or is coupled to a "flowjector" (Dyna-Jet type) which is arranged to direct a high-speed airflow past the fuel jet. Air pressure must be sufficient to force open the reed valves and thus admit inflammable mixture into the combustion chamber.

To initiate combustion, a spark plug is usually fitted in the combustion chamber which can be temporarily connected to a suitable source of electrical energy. An alternative method sometimes used for model jets is the application of flame ignition at the tailpipe, either by means of a kerosene blowlamp or through the simple medium of an open can of kerosene or gasoline soaked rags.

When the engine fires, back pressure, due to the rapid expansion of the burning charge, causes the valves to close and the hot gasses are accelerated down the tailpipe. The inertia of these gasses is such as to now produce a negative pressure (i.e. below atmospheric) within the combustion chamber, causing the valves to open and thus drawing in a fresh charge. This, in turn, is ignited by contact with the hot residual gasses of the previous charge, closing the valves and so repeating the cycle.

The frequency with which this process occurs is a function of the natural resonance of the tailpipe and efficient operation would appear to be dependent on engine geometry, valve design, etc., being balanced with this. Normal frequency for an engine of the Dyna-Jet type is around 220-240 c.p.s. and it will be seen that this does in fact, correspond to the resonant frequency for a 14-15 in. effective tailpipe, the resonance of any closed tube being a function of its length multiplied by four and divided into the speed of sound.

Thus, it is inherent in the full-scale pulse-jet, with its longer tailpipe, to operate at substantially lower frequencies than the Dyna-Jet—i.e., it produces fewer power pulses per second. As a result of this, it will be found that model jets usually develop higher thrust-weight ratios than their full-scale counterparts.

(*To be concluded*)

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Berkeley's RADIO CONTROLLED FLYING SCALE Designs

RADIO-CONTROL ... FREE-FLIGHT ... CONTROLINE

Forney
"AIRCOUPE"

For Radio Control— Free-Flight— Controline

Kit No: 3-7 **1½" Scale .074 to .29 Engines**

$5.95

As much fun as it is to fly-it may be built as a free-flight, radio or controline design. Stable and easily adjusted as a free-flight, rugged and fun to fly. As a radio design-ideal for rudder and motor control, with the data on plans. A truly practical scale design for rough and ready controline flying.

CESSNA "170"

$12.95

Radio Control — Free-Flight — PAA-Load .25 to .35 Engines — 72" Span — 2" Scale

Controlling your "Cessna 170" by Radio is a thrill you will not forget! Perfect in scale, rugged, stable in all attitudes, yet responsive in control, with good wind penetration qualities. The gear location is ideal for extended take-off runs. The larger than average size makes it easier to control in windy weather.

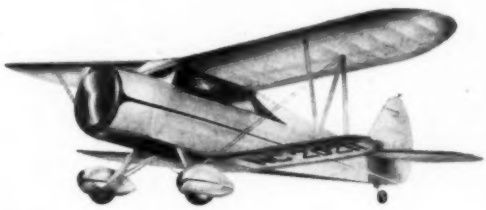
"KING SIZE FLYING SCALE"

"WACO CABIN"

For Radio Control—Free-Flight—Controline

1½" Scale —52" Wingspan

For .14 to .29 Engines Kit No: 3-6 **$9.95**



The fly" scale "Waco" spans 52". Weight with all radio equipment installed is 4½ lbs. 630 sq. inches wing area. Model is designed for multiple control through compound escapement systems. In flight it is very stable and easily controlled with rudder only type installations. Rudder, elevators, motor and steerable tailwheel may be actuated. Radio equipment is removable as a unit for convenience.

$4.95 De Havilland

• Formed Metal Ring Cowl

"BEAVER"

This high aspect-ratio Canadian Bush Flying type aircraft now is in use by the U.S. Air Force. As a scale design, it is well proportioned and capable of contest performance. In R.C. and Controline flying, its long moment arm make it ideal for spot landings with motor control, Metal Cowl, Full Size Plans, etc.

"CESSNA 172"

BIG 1⅛" SCALE

54" WINGSPAN FOR .09 to .19 ENGINES

• **Adjustable Ailerons** for manually setting trim

• **Laminated Structure** stronger, lighter, easier

$7.95

• **Operating Wing Flaps** radio or controline actuated

Here is the latest scale "Cessna" that is a "natural" for radio control. The big prato ship takes-off and lands with "hands-off" control. The model handles just as easy! It's a model builders dream ship!

The kit is very complete in true Berkeley tradition with prefabricated wood parts, silkspan, landing gear and hardware, plus the super-detailed plans and full-colored authentic decals found only in Berkeley Kits.

Army Liaison YL-24

"HELIOPLANE" $3.95

Variable Camber Wing for Two-Speed Radio Control Flying

For .049 to .14 Engines — 39" Wingspan — 1" Scale

"Helioplane" is first model that permits use of scale flaps. Depress 10 degrees for free flight; 25 degrees for slow speed control by radio; or raise 5 degrees for high speed.

"KING SIZE FLYING SCALE"

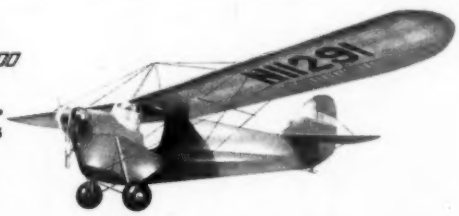
1½" Scale — 54" Wingspan

AERONCA "C-3"

For Radio Control — Free-Flight — Controline

.09 Engines R.C. — .074 Free-Flight — .15 Engines Controline

Kit No: 3-5 **$5.95**



Designed for rudder control with optional elevator and motor control. Ailerons can be set for trim. All equipment easily accessable through the cabin. Controline version is fun to fly with motor control.

NAVION "Super 260"

2" Scale — 68" Wingspan **For .23 to .65 Engines**

This beautiful scale replica of the famous "Navion" is a fast, rugged and truly different R.C. or Free Flight design, easily adapted to Controline Flying. Thrill to its flashing performance and smooth response. As a free-flight, it will give you experience and confidence in low wing designs. Big, roomy, and well engineered, it will set the pace wherever it's flown. Easy to build!

$15.95

Radio Control — Free-Flight — PAA-Load

.18 to .25 Engines—71" Span—2" Scale

PIPER CUB J-3" $9.95

The "Piper Cub J-3" needs no introduction. Most famous of all light aircraft, it's a natural for R.C. or Free-Flight flying. The six foot span permits the extra R.C. installation that you dream about. This is a rugged, detailed, flight proven design. Full-Size Plan with R.C. installations, Authentic Decals, etc.

Piper
"TRI-PACER" $5.95

This perfect scale R.C. design may be built as a Free-Flight or Controline version if desired. Full Size Plans cover special details for all three versions. Flaps, elevator, rudder, motor and nose gear may be operated by R.C. Ailerons for trim, cabin door access to Radio, Highly Pre-fabricated, Authentic Decals.

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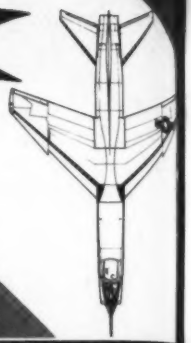
WEST HEMPSTEAD, NEW YORK, U.S.A.

If no local dealer is convenient, mail orders will be filled by Berkeley Model Supplies, Dept. MA., West Hempstead, N. Y. Please include 25¢ packing & postage.

"MODEL OF THE MONTH" by Berkeley



- Full Size Berkeley Detailed
- Authentic Multi-color Dem
- Formed Celluloid Bubble Co
- Die-Cut Balsa and Plywo
- Formed Plastic Fuselage Pa
- Metal Propulsion Fa

¾" 1' Scale For "½A" Engines
27" Wingspan 33¾" Length

DUCTED-FAN

"½A" Gas Engine Powered

VOUGHT F8U-1 "CRUSADER"

Powered by ...ott & W... ...57-P4 ... burner, the "Cru..." hold... ...a's spe... ...of 1,015 m.p.h. ...s made ... ...test tr... ...ntal flight ... The firs... ...Aircraft ... ...1000 m.p.h.

Full si... ...with ca... ...ganized cons... ...nd sketch... ...his model ea... ...nstruction is ... ...t for maximu... ...tan performa... ...lastic parts ... ...sembly.

...years experimentati... ...y, with ducted f... type models have ... ...this dramatic new ... a realit... ...static thrust make ... ...ve. Ideal for new "pull-... ...engines.

Landing G... ...

$4.95

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or Sta...el's Monoline

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For ALL Glow Plug Motors . . .

Scientifically developed to give you maximum life and high performance. Gives you faster starts in any weather. It's the coolest-running fuel available. The proven champion in hundreds of meets. FOX Superfuel guards your motor from these 3 causes of engine failure:

Preignition. No overheating with Superfuel's stable ignition characteristics.

Grit, Grime and Dust. Superfuel detergent action quickly cleans your motor, and KEEPS it clean.

Superfuel quality lubricants keep moving parts safe with a protective oil film.

85¢ pint

HOTTEST FUEL MADE

A genuine competition fuel specially compounded for WINS in all free flight and control line events. May be used straight or as a blend. In an actual test, a FOX 35 Combat Special, using Hi Nitro, produced 60% more power than with ordinary fuels.

$1.25 pint

CAUTION:

Many motors cannot operate with straight Hi Nitro. Your motor should be fueled with a progressively higher proportion of Hi Nitro to Superfuel until no further gain in power is obtained. This "custom blend" is the most efficient fuel for your motor.

Get either fuel at your dealers now. You know it's good when it's CHAMPION!

Champion PRODUCTS

P. O. BOX 1175-A
FORT SMITH, ARKANSAS

MANUFACTURED AND GUARANTEED BY

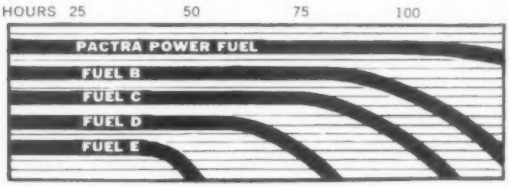
pactra POWER FUEL

with LUBEX 27

prolongs engine life

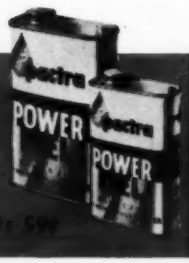
Compare the FULL POWER curve of Pactra POWER FUEL against those of 4 other leading fuels... There is *no sharp drop off* of power because its new lubricant—Lubex 27—unlike others, leaves no varnish or sludge to accumulate on engine parts! A minimum of *soft residue* is quickly expelled by the exhaust.

This is the chart that tells the story



Pactra POWER FUEL runs cooler for *maximum* protection against overheating, seizing, and scoring. Its balanced formula permits a very broad range adjustment on the needle valve and slips smoothly from 2- to 4-cycling when plane is stunting. Get a can today and watch it bring back *new engine* efficiency and power to your flying!

Made by the makers of Aero Gloss



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